*Final Report*

# Taylor Lumber and Treating Superfund Site Final Design and Design Basis Report

Prepared for

**U.S. Environmental Protection Agency**

**Task Order Number 024-RD-RD-10F1**
**EPA Contract Number 68-S7-04-01**

December 2006

Prepared by

CH2MHILL

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# Acronyms and Abbreviations

| | |
|---|---|
| AC | asphalt concrete |
| AMSL | above mean sea level |
| ARARs | applicable or relevant and appropriate requirements |
| BMP | best management practice |
| CAMU | Corrective Action Management Unit |
| CBR | California Bearing Ratio |
| CERCLA | Comprehensive Environmental Response, Compensation and Liability Act |
| cm/sec | centimeters per second |
| CQAP | Construction Quality Assurance Plan |
| CSI | Construction Specifications Institute |
| DBR | Design Basis Report |
| DNAPL | dense non-aqueous phase liquid |
| DTM | digital terrain model |
| EPA | United States Environmental Protection Agency |
| ERA | ecological risk assessment |
| ESCP | Erosion Control and Sedimentation Plan |
| FS | feasibility study |
| FWD | falling weight deflectometer |
| HDPE | high-density polyethylene |
| HHRA | human health risk assessment |
| HSP | Health and Safety Plan |
| IC | institutional control |
| I&M | inspection and maintenance |
| µg/L | micrograms per liter |
| mg/kg | milligrams per kilogram |
| mm | Millimeter |
| NAAQS | National Ambient Air Quality Standards |
| NAPL | non-aqueous phase liquids |
| NPDES | National Pollutant Discharge Elimination System |
| NPL | National Priorities List |
| O&M | operation and maintenance |
| ODEQ | Oregon Department of Environmental Quality |
| ODOT | Oregon Department of Transportation |
| OMP | Operations and Maintenance Plan |
| PCP | Pentachlorophenol |
| POTW | publicly owned treatment works |

| | |
|---|---|
| PVC | polyvinyl chloride |
| PWPO | Pacific Wood Preserving of Oregon |
| RA | remedial action |
| RAO | remedial action objective |
| RCRA | Resource Conservation and Recovery Act |
| RD | remedial design |
| RI | remedial investigation |
| ROD | Record of Decision |
| RPM | Remedial Project Manager |
| RRD-E | East Railroad Ditch |
| RRD-W | West Railroad Ditch |
| SARA | Superfund Amendments and Reauthorization Act |
| SWTS | stormwater treatment system |
| TLT | Taylor Lumber and Treating |
| TOPO | Task Order Project Officer |
| TP | Treatment Plant Area |
| TPS | Treated Pole Storage Area |
| USACE | U.S. Army Corps of Engineers |
| UTS | universal treatment standard |
| VE | value engineering |
| WA | Work Assignment |
| WPRR | Willamette Pacific Railroad |
| WPS | White Pole Storage Area |
| XRF | x-ray fluorescence |
| $yd^3$ | cubic yard |

# 1.0 Introduction

SECTION 1

# 1 Introduction

The United States Environmental Protection Agency (EPA), under the authority of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), has initiated remedial design (RD) activities for the Taylor Lumber and Treating (TLT) Superfund site to address potential risks to human health and the environment posed by site conditions. This Final Design and Design Basis Report (DBR), prepared by CH2M HILL under EPA Contract Number 68-S7-04-01 as set forth in Work Assignment (WA) Number 024-RD-RD-10F1, communicates in a narrative format CH2M HILL’s understanding of the project and its requirements. This document will serve as an informational resource to accompany the contract documents during the bidding process for the remedial action construction contract.

## 1.1 Background

The TLT Superfund site is located in Yamhill County, Sheridan, Oregon (Figure 1-1). The site was listed on EPA’s National Priorities List (NPL) on June 14, 2001.

TLT operated a sawmill and wood treating facility at the site from 1946 to 2001. Wood-treating operations commenced in 1966 in the western portion of the facility, and predominantly consisted of the treatment of Douglas fir logs for utility poles and pilings. The primary wood-treating chemicals used by TLT included creosote, pentachlorophenol (PCP), and Chemonite (a solution of arsenic, copper, zinc and ammonia). All operations ceased when TLT filed for bankruptcy in 2001. Pacific Wood Preserving of Oregon (PWPO) entered into a Prospective Purchaser Agreement with EPA and purchased the wood-treating portion of the facility (approximately 37 acres). PWPO began wood-treating operations in June 2002. Other entities purchased the remaining portion of the former TLT holdings.

PWPO currently performs wood-treating operations using copper- and borite-based treating solutions. In general, PWPO conducts wood-treating operations and stores poles on the same portions of the property where these activities were conducted by TLT. Wood treatment is conducted in the eastern portion of the facility, and untreated wood is handled and stored on the western portion of the facility. Since 2002, new structures have been constructed and certain areas have been covered with asphalt or gravel.

The remedial action at TLT is focused on the wood-treating portion of the facility currently owned by PWPO. The portion of the site being addressed by the remedial action encompasses approximately 37 acres (as determined by a photogrammetric survey, CH2M HILL 2006a) located west of Rock Creek Road, and is divided into the Treatment Plant (TP) Area, White Pole Storage (WPS) Area, and Treated Pole Storage (TPS) Area. The designations of these areas reflect general property usage by the former TLT (Figure 1-2).

The primary areas of contamination and their sources at the TLT site include:

- Subsurface groundwater contamination, including dense non-aqueous phase liquid (DNAPL), in the vicinity of the TP Area resulting from past drips, spills, and leaks of wood-treating chemicals from aboveground chemical storage tanks, drip pads, and tank farms.
- Surface soil contamination in the vicinity of the TP Area and areas of former treated wood storage resulting from spills, drippage, and storage of wood treating chemicals.
- Surface soil contamination in roadside ditches that abut the facility (contamination resulted from surface water runoff, spills associated with wood-treating operations, and deposition of contaminated dust).
- Contaminated soils from interim and removal measures conducted at the site are consolidated in the Soil Storage Cells located in the northwest corner of the facility.

### 1.1.1 Remedial Investigation and Feasibility Study

EPA initiated a remedial investigation and feasibility study (RI/FS) in April 2001. The *Phase 1 Remedial Investigation Report* (evaluation of nature and extent based on existing data) was completed in January 2002, and the Phase 2 RI (field investigation needed to fill data gaps for the RI/FS) was conducted in 2002 and 2003. The RI Report summarizes the site investigation activities and presents data on the nature and extent of contamination at the site. RI data were used to conduct a baseline human health risk assessment (HHRA) and ecological risk assessment (ERA).

The FS was conducted in 2003 and 2004. The *Feasibility Study Report* describes the development and evaluation of remedial action alternatives for affected soil and groundwater. The complete RI/FS was provided to stakeholders for comment in December 2004. An errata sheet was produced in May 2005, and the RI/FS was finalized in May 2005.

### 1.1.2 Record of Decision

Based on information presented in the RI/FS report (CH2M HILL, 2004), EPA promulgated its decision for addressing risks at the TLT site through a Record of Decision (ROD; EPA, 2005). The major elements of the remedy described in the ROD included:

- Continued operation and maintenance of the underground barrier wall system at the site, including continuing extraction and treatment of groundwater from within the barrier wall, to prevent migration of contaminated groundwater and DNAPL beyond the wall.
- Replacement of the existing asphalt cap, which covers the area within the existing barrier wall, with a durable, low permeability cap to protect human exposure through direct contact with contaminated soils.
- Excavation or capping and consolidation of contaminated soils located onsite and in ditches, in coordination with applicable state and federal regulations. If cost-effective, excess soil that is not consolidated onsite may be sent offsite to an acceptable disposal facility.

- Operation and maintenance (O&M) of the caps to ensure protection of human health and the environment.
- Long-term groundwater monitoring for pentachlorophenol (PCP) to confirm that contaminated groundwater does not pose an unacceptable risk to human health or the environment. The focus of this effort will be to protect ecological receptors in adjacent surface water (Rock Creek, South Yamhill River).
- Periodic monitoring of groundwater for PCP in two nearby residential wells to confirm that PCP concentrations remain below Federal and State drinking water standards.
- Institutional controls (ICs) for the property restricting groundwater use, non-industrial land use, and breaching of the capped areas.

The selected remedy will protect human health and the environment by preventing contact with contaminated soil above risk-based criteria, and reducing the potential for contaminated soil and groundwater to migrate off-property and to adjacent water bodies. The TLT site will continue to be available for industrial land use.

### 1.1.3 Post-ROD Design Activities

#### Stormwater Treatment System

An analysis of the existing stormwater treatment system (SWTS) was conducted by CH2M HILL and a technical memorandum was submitted to EPA entitled, *Stormwater Treatment System Evaluation* (CH2M HILL, 2006b). The memorandum recommended that additional surface water runoff not be added to the SWTS without making some improvements to the system, such as adding more storage capacity. The memorandum also recommended some improvements to the system that could potentially improve overall system performance under current flow conditions. Improvements to the SWTS, if any, will not be considered as part of this DBR.

#### Soil Storage Cell 2

The strength and moisture content of Soil Storage Cell 2 was investigated by CH2M HILL. A work plan for the investigation was submitted to EPA entitled, Cell 2 Inspection and South-east Corner Soil Sampling Plan (CH2M HILL 2006c). On July 19, 2006, Cell 2 was inspected by removing a portion of the high-density polyethylene (HDPE) cover and probing the underlying soil to determine the depth and location of soft materials contained in the cell. Results from this investigation were documented in a field memo (CH2M HILL 2006d).

#### Onsite Soil Sampling

Soil samples were collected from the southeast corner of the site, near the SWTS, to confirm the presence or absence of elevated arsenic levels in surface soil. Results from this investigation were documented in a field memo (CH2M HILL 2006e).

#### Pavement Testing

Additional data was necessary to support pavement design to repair and improve the existing barrier wall asphalt cap. Pavement testing was conducted by GeoDesign during the last week in July to help determine the cause of cap failure and provide information about the existing subgrade and asphalt that can be used in the design calculations. The field report (CH2M HILL, 2006g) and data report (GeoDesign, 2006) were used in the design calculations.

### Gully Soil Sampling

CH2M HILL collected soil samples in August, 2006 from the two gullies south of the facility and analyzed for arsenic and dioxin to determine whether contaminant concentrations were still elevated, and if excavation in these areas is necessary. Results from this investigation were documented in a data report (CH2M HILL 2006h).

### Contained-In Determination

EPA proposes to dispose the soils in the Soil Storage Cells at a Subtitle D disposal facility. In order to meet applicable criteria for Subtitle D disposal, EPA is seeking a contained-in determination, documenting that hazardous waste is no longer contained in these soils. A memorandum was drafted to provide the necessary background information and rationale for the contained-in determination for these soils (CH2M HILL 2006i).

## 1.2 Purpose and Objectives

The purpose for the RD is to prepare a bid document that translates the requirements of the ROD into a set of documents, drawings, and specifications that will permit EPA to seek competitive bids from qualified contractors.

The overall objective for the DBR is to ensure that CH2M HILL has correctly interpreted the requirements of the ROD. As described in the *Remedial Design Work Plan* (CH2M HILL, 2006a), the DBR defines the technical parameters on which the design is based. The DBR draws existing information from the RI/FS report, ROD, the supporting technical memoranda prepared in 2006, and discussions with the Task Order Project Officer (TOPO). The DBR includes a project description, summary of ROD requirements, listing of key design criteria, and design assumptions. It documents how the design will comply with applicable or relevant and appropriate requirements (ARARs) and the ROD, and addresses any variances from the ARARs and ROD.

The first draft of the DBR was submitted to EPA at the beginning of the Preliminary Design Phase. Subsequent drafts were submitted with the completed Preliminary Design and Prefinal Designs, and this final draft is submitted with the Final Design. Therefore, the DBR has evolved along with the design, and has incorporated changes that have occurred in the process.

## 1.3 Design Submittals

The RD included preparation of the following submittals:

- Draft DBR. Defines the assumptions and technical parameters upon which the design will be based (submitted July 2006).
- Preliminary Design Report (30 percent). The Preliminary Design Report contained a project delivery strategy and schedule, a preliminary construction schedule, a

preliminary remedial action (RA) cost estimate and a general specifications outline. Approximately 10 preliminary drawings, including a site layout map and preliminary remediation plans and sections, was provided, together with a revised DBR (submitted September 2006).

- Prefinal Design Report (90 percent). The Prefinal Design Report contained an updated DBR (this document), all drawings and specifications necessary to complete the project, a draft Construction Quality Assurance Plan (CQAP), a draft Soil Sampling and Analysis Plan (SSAP), and an updated construction schedule. The Prefinal submittal also includes a draft Inspection and Maintenance (I&M) Plan for the asphalt cap, and a revised construction cost estimate, both submitted under separate cover.
- Final Design Report. The Final Design Report (this document) contains a final DBR, CQAP, SSAP, and construction schedule. Design drawings and specifications, and an I&M Plan for the asphalt cap, are provided under separate cover.

## 1.4 DBR Organization and Content

The content of the DBR, which was generally developed in accordance with guidance provided in the *Remedial Design/Remedial Action Handbook* (EPA, 1995), is organized as follows:

- **Section 1**—Introduction: contains general information about the TLT RD project and identifies key issues where EPA concurrence is required.
- **Section 2**—Site Conditions: presents a description of TLT's environmental setting and provides physical information and data for the site to be addressed under the RA.
- **Section 3**—Design Requirements: presents the remedial action objectives (RAOs) and a description of the preferred alternatives selected in the ROD.
- **Section 4**—Design Basis: contains a narrative summary describing how the selected remedial alternative will be implemented.
- **Section 5**—Design Optimization: identifies several approaches for implementing the remedy that could yield potential cost savings during the RA.
- **Section 6**—Remedial Action Contracting Strategy: discusses the post-RD report activities involved with RA contractor procurement.
- **Section 7**—Permit Considerations: identifies federal, state, and local permits that would typically be required for RA construction activities. Although the design will comply with the technical requirements for onsite activity, it is assumed that administrative requirements will be waived under the CERCLA exemption.
- **Section 8**—Land Access and Easement Requirements: discusses access and easement agreements that will be necessary for the RA.
- **Section 9**—Final Design: discusses the 100 percent design drawings and specifications, remedial action cost estimate, and provides an updated construction schedule.

Throughout the DBR and the Final Design drawings and Specifications, the roles and responsibilities of EPA, the remedial action contractor (Contractor), the remedial action oversight contractor (Engineer), and the facility owner (PWPO or Owner) are defined and discussed.

## 1.5 Key Issues

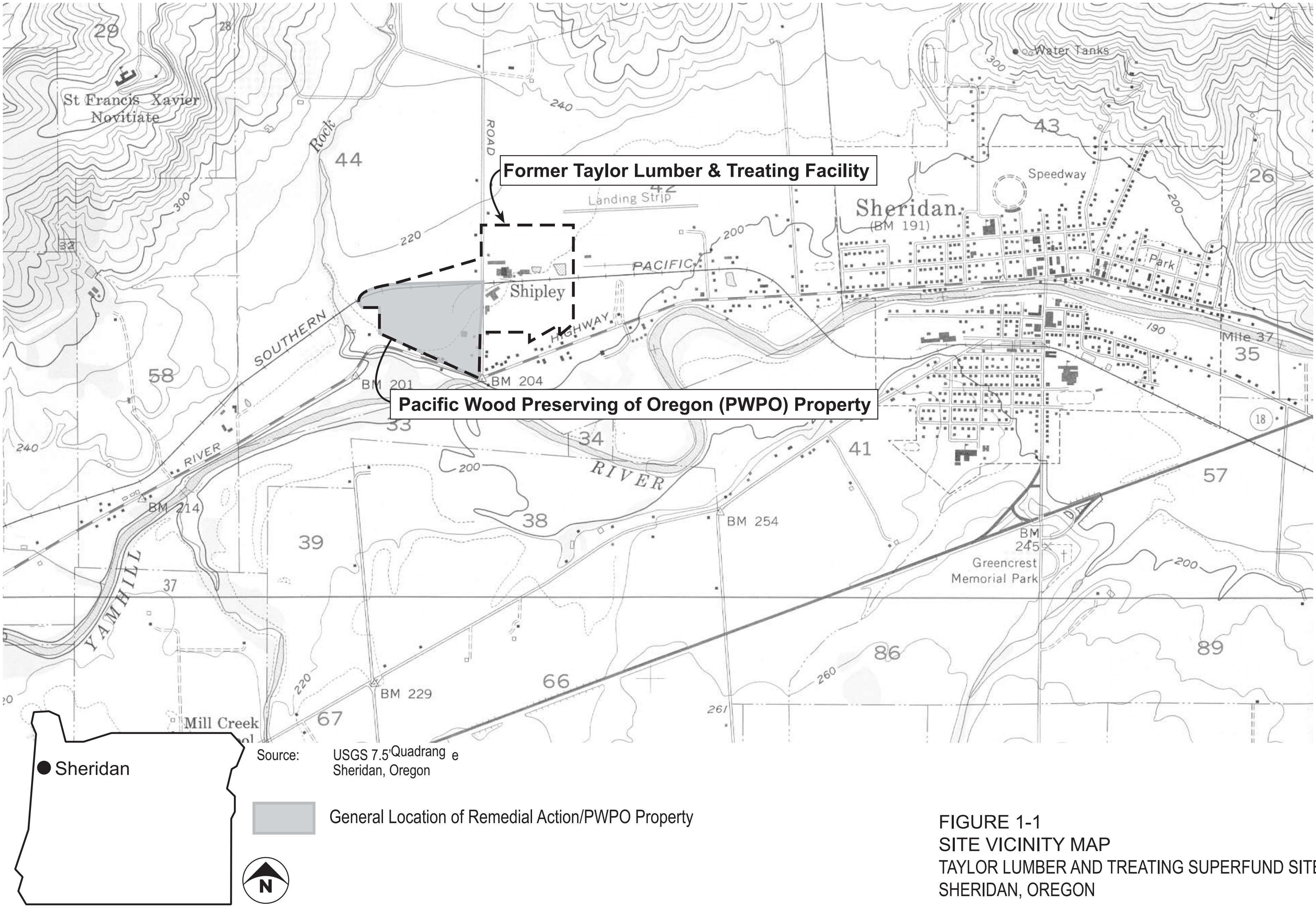
Most of the key issues identified in the first drafts of the DBR have been resolved as described below:

- A final inspection of Cell 2 was conducted on August 29 before replacing the cover to protect the contents from winter rains. During the five weeks it had been exposed, the soil had dried and cracked to a depth of 12 to 18 inches. Soil below that depth was still soft enough to easily probe with a stick. It appears that the contents of Cell 2, if exposed during the dry summer months and then mixed, will be sufficiently dry to truck offsite, without dewatering. Additionally, if needed, the wet soil can be mixed with some of the surrounding soil to eliminate any free water.
- An area of elevated arsenic concentrations in surface soil in the southeast corner of the TP Area was identified based on elevated arsenic at one sample location. This area was resampled in July 2006, and the results showed that arsenic concentrations in surface soil were at background levels. EPA has decided that this area does not need to be addressed in the RA.
- Contaminated soil has been observed very close to the dryer in the TPS Area. This area was viewed and discussed during the July site visit. Excavation requirements around the dryer and in the adjacent ditch, and removal and replacement of the chain-link fence are included in the design drawings.
- A new culvert has been identified that drains from the ditch along the north side of Highway 18B, beneath the roadway, discharging toward Rock Creek to the south. EPA and CH2M HILL determined that this culvert will be cleaned out during the RA, but that there was no evidence that the drainage carried by the culvert originated from the facility, and therefore there is no need to collect additional soil samples below the culvert.
- Historical sample locations shown on previous site figures did not align with the new base map created from recent land survey and photogrammetric mapping information for the site. These sample locations have been placed on the new basemap using GPS survey data and field measurements where available as shown in Appendix A.
- Pavement testing was conducted in late July to support the pavement design for the Treatment Plant Area. Based on equipment loading, test results, traffic patterns, and observed areas of pavement damage, areas of the existing cap have been designated for reconstruction or repair prior to placement of the low permeability asphalt overlay.
- The gullies south of the facility were resampled in August to determine whether current soil contaminant levels justified excavation in these areas. Based on these results, only the westernmost gully (RCG) will be excavated.

- It was decided that separating the gravel from the excavated soil to reduce disposal costs will be conducted using dry sieving only in selected areas. The coarse material will be reused onsite as backfill provided the screening operations meets quality control criteria.
- The two open drainage ditches in the southern portion of the paved area will be paved over and graded to match the surrounding areas. EPA has given PWPO authorization to fill in the easternmost open drainage swale on the cover and install a culvert to convey stormwater flow; however, CH2M HILL inspection of the proposed culvert locations indicates that replacement of the swales with culverts will not provide adequate surface drainage of the asphalt cap. The Final Design includes installation of trench drains to convey the stormwater that formerly flowed through these ditches to the SWTS. In addition, the culvert crossing the barrier wall at the easternmost open drainage swale appears to have failed due to equipment traffic, causing uplift of the pavement and culvert at the inlet. This culvert will be removed and replaced by a trench drain extending to the limit of the pavement.
- The Final Design assumes that a contained-in determination will be approved (CH2M HILL, 2006i) and Cell 3 will be screened and the fines disposed of at a Subtitle D landfill. The gravel will be used as backfill onsite. Cells 1 and 2 will not be screened, and will be disposed of entirely at a Subtitle D landfill.

Remaining issues beyond the scope of the design that must be addressed prior to construction include:

- Excavation along the railroad main line will require a Right-of-Entry permit from the Willamette Pacific Railroad. This is a long-lead activity.
- PWPO has indicated that a leaking water line may be causing the asphalt to fail near asphalt sampling location 18. Apparently, PWPO shut off the water line from the area near the office buildings (at the hydrant) because they suspect that the line that flows from there to the area near MW-3S may be leaking (potentially near the northern fire hydrant). This issue should be addressed before the 2007 construction season.
- PWPO has indicated that use of the SWTS would incur operational costs and PWPO expects reimbursement for those costs. Negotiations between PWPO and EPA will be required prior to construction to determine applicable costs for use of the SWTS.




Source: USGS 7.5' Quadrangle
Sheridan, Oregon

General Location of Remedial Action/PWPO Property

FIGURE 1-1
SITE VICINITY MAP
TAYLOR LUMBER AND TREATING SUPERFUND SITE
SHERIDAN, OREGON

CH2MHILL

ES072006001CVO 342790.PD.02 Taylor Lumber "Taylor_Fig1-1_v02.fh10" 10/10/06 amh

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FIGURE 1-2
SITE PHOTO
TAYLOR LUMBER AND TREATING SUPERFUND SITE

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# 2.0 Site Conditions

SECTION 2

# 2 Site Conditions

This chapter of the DBR describes general site conditions in the vicinity of the TLT site and their relationship to RD and RA construction planning. A majority of this information was adapted from the RI/FS report (CH2M HILL, 2004).

## 2.1 Location

The TLT site is located in northwest Oregon on the lower east slopes of the Coast Range within the South Yamhill River valley. Figure 2-1 is a map showing existing site conditions. The facility is in Yamhill County, Section 33, Township 5S, Range 6W, approximately 1 mile west of the City of Sheridan. The property lies north of and adjacent to the intersection of Rock Creek Road and the West Valley Highway (Highway 18B) at 22125 SW Rock Creek Road.

## 2.2 Topography

The site slopes gently to the southeast from an elevation of approximately 210 feet above mean sea level (AMSL) at the northwest corner of the property, to approximately 205 feet AMSL at the southern property line. The South Yamhill River is approximately 200 feet from the southern boundary of the facility. Immediately south of Highway 18B the terrain drops steeply to the South Yamhill River at an elevation of 185 feet AMSL. The topography of the site is shown in Figure 2-1.

## 2.3 Weather

The average annual temperature in the Sheridan area is 52.4°F, with an average yearly precipitation of 41.7 inches (Oregon Climate Service, http://www.ocs.oregonstate.edu). Average monthly rainfall totals from 1971-2000 are shown in Figure 2-2. In winter, periods of snow and freezing weather can be expected (USGS, 1992). The facility is located in the South Yamhill River 100-year floodplain (FEMA, 1983).

Figure 2-2 also displays the extreme 24-hour precipitation events from 1971-2000. The most extreme 24-hour event was 3.58 inches and occurred during October. The 3.58-inch event is considered to be representative of a 25-year, 24-hour design storm at the site.

Wind rose information obtained in Salem, Oregon, from 1961 to 1990 indicates the predominant wind direction is from the south (Figure 2-3), with an average wind speed of 7.39 knots (8.5 miles per hour). The predominant wind direction is favorable in that it is in the direction of primarily agricultural and vacant land. However, dust mitigation will be required during construction activities to prevent the possible transport of dust toward the fairly sparse residential population located primarily to the west of the site.

## 2.4 Geologic Setting

Four distinct geologic units have been observed at the TLT site: fill material, fine-grained upper alluvium, coarse-grained lower alluvium and siltstone. The fill material consists of silty to gravelly clay and road gravel, and ranges up to 5 feet thick. The unconsolidated alluvial and lower river terrace deposits of Holocene age overlie the siltstone. The upper alluvium consists of silty clay and or clayey silt, and ranges in thickness from approximately 3.5 to 10.5 feet. The lower alluvium consists of sandy silt and silty sand that grades to silt, sand and gravel with depth. The lower alluvium ranges in thickness from approximately 3 to 13 feet, averaging approximately 7 feet. The siltstone, which is classified as the Yamhill Formation, is estimated to be approximately 2,000 feet thick. Overall, the siltstone is massive in character and did not exhibit significant primary or secondary permeability. Generalized geologic cross-sections of the site are presented in Figure 2-4. The cross-section locations are shown in Figure 2-5, along with a contour map delineating the top of the siltstone unit.

The relatively thin layer of alluvium forms a modest, local-scale water-bearing zone beneath the site. The thick sequence of siltstone underlying the site is a low-yielding hydrogeologic unit viewed as the basement confining unit for the western Willamette Valley. Water levels measured in monitor wells at the site indicate depth to groundwater at between approximately 2 and 10 feet below ground surface (bgs). The lower alluvium has a greater hydraulic conductivity and is the primary water-bearing zone at the site, where groundwater occurs under semi-confined conditions.

## 2.5 Surface Water Features

During TLT operations, surface water from the site flowed to off-property ditches and eventually to the South Yamhill River. Currently, surface water from most of the TP and TPS areas is collected and treated in an onsite stormwater treatment system prior to discharge to the South Yamhill River. Stormwater from other portions of the site flows through ditches to the river. The roadside ditches are dry in the summer, and do not support fish populations.

## 2.6 Land Uses

### 2.6.1 Current Land Use

PWPO currently owns and operates the wood treatment facility. Several residences are located east of the Treatment Plant, along Rock Creek Road and along West Valley Highway. One of the residences on Rock Creek Road, just north of West Valley Highway, runs a small sawmill operation. In addition, there is a single family home just beyond the western site boundary. The property south of the West Valley Highway is currently vacant and is owned by “Dee” Industrial.

No hospitals or retirement facilities are present within 0.5 mile of the site; however, Head Start recently built a children’s daycare facility across Highway 18B, about 400 feet east of Rock Creek Road.

### 2.6.2 Zoning

The TLT site is within the City of Sheridan's Urban Growth Boundary. A small portion of the West Facility is located within the limits of the City of Sheridan and is zoned light industrial. All other nearby property that is within the city limits and is east of Rock Creek Road and north of Highway 18B is also zoned light industrial. The nearby property that is within the city limits and is south of the former TLT facility (that is, south of Highway 18B) is zoned mixed residential and commercial, and the property that is north of the facility along Rock Creek Road is zoned for urban transitional, light industrial, and public facilities.

The portion of the TLT site that is not within the city limits is within the unincorporated area of Yamhill County and is classified and zoned as a heavy industrial district.

### 2.6.3 Future Land Use

It is anticipated that the site will continue to be used for industry, while the surrounding area will remain a mix of agriculture, residential, and light industry.

## 2.7 Groundwater and Surface Water Uses

### 2.7.1 Groundwater

A groundwater beneficial use survey was conducted in 1988 and updated in 1996. The two wells located within 500 feet of the TLT site are both residential wells. Well RW-01 is located west and cross-gradient from the site at (b) (6), and is presently used for domestic purposes. Well RW-02 is located downgradient of the site at (b) (6) (b) (6). The residence at this address is on City of Sheridan water, and the well was at one time used for outdoor watering.

There are currently no direct users of shallow (alluvial) or deep (siltstone) groundwater downgradient of the site. However, surface water recharge (flow to the South Yamhill River and Rock Creek) from groundwater is an important beneficial use.

Possible future beneficial uses for the shallow groundwater downgradient from the site include domestic, agricultural, irrigation and industrial applications. Groundwater from the siltstone is generally of poor quality. Chloride concentrations up to 4,200 mg/L have been detected in deep onsite wells (MFA, 1997), making it unsuitable for most domestic and industrial uses.

### 2.7.2 Surface Water

The South Yamhill River flows generally to the east past the TLT site and the City of Sheridan, joining the North Yamhill River approximately 40 river miles northeast of the TLT site, and becoming the Yamhill River near McMinnville. During dry summer months, the City of Sheridan uses river water to supplement the primary source of spring water from Stoney Mountain. The City's water intake is located approximately 2.5 miles downstream from the TLT site.

The South Yamhill River is a migratory corridor for several anadromous fish species, the most common being Coho salmon and steelhead. The South Yamhill River sub-basin is used extensively for recreation, including fishing, hunting, boating, water recreation, and wildlife viewing.

## 2.8 Facilities and Infrastructure

PWPO actively uses the site for wood-treating. Numerous facilities and infrastructure exist onsite, including:

- A SWTS that is NPDES permitted to treat stormwater runoff, extracted groundwater, and boiler blowdown.
- A railroad access spur.
- An oil-water separation system including a boiler/evaporator for the separation and recovery of water- and oil-based wood treating solutions.

Various above ground and underground utilities are located on the property. The locations of known underground utilities are shown on the Utility Plan included in the Final Design drawings. The utilities were identified using public and private utility locate services, and subsequently surveyed for mapping purposes. Additional private utilities were located as best estimates by PWPO staff who had knowledge of a particular utility, or were taken directly from drawings related to previous remedial or construction activities. Public utilities include:

- Electricity (PGE)
- Water (City of Sheridan)
- Natural Gas (NW Natural)
- Sewer (City of Sheridan)
- Telephone/Telecom (Sprint/UVision)
- Railroad (Willamette Pacific)

NW Natural has noted that a high-pressure gas line accesses the site, and if any excavation work is performed within 10 feet of the line a NW Natural representative must be onsite during the work. Also, if work is performed within the railroad right-of-way (25 feet from the centerline of the tracks), a railroad flagger is required onsite.

A number of plant-specific utilities or conveyance resources are located onsite, including:

- Plant water lines [some lines are transite (asbestos/cement) or PVC] and could not be positively located]
- Plant steam line (supplied to the dryer from the boiler inside the barrier wall area)
- Groundwater extraction system air and water lines
- French drain system
- Stormwater conveyance system
- Groundwater extraction and monitoring wells

## 2.9 Remediation Area Descriptions and Quantities

Remediation areas consist of areas that were addressed or created as part of past interim actions at the site and contaminated in-place soil that has not been addressed through prior activities. Past remedial efforts at the site included paving part of the TPS Area, removing areas of arsenic contamination from the roadside ditches, and installing a barrier wall (bentonite slurry) to contain non-aqueous phase liquids (NAPL) present beneath the TP Area. The ground surface enclosed by the barrier wall was paved, and a groundwater extraction system constructed within the barrier wall to maintain an inward hydraulic gradient. Contaminated soil from various pre-existing stockpiles, in addition to soil resulting from interim action activities, was consolidated and moved to Soil Storage Cells located in the northwest corner of the site in 2000. Relatively small amounts of soil have been added to these cells since 2000.

These remediation areas are described in greater detail in the following subsections.

### 2.9.1 Barrier Wall Area

The barrier wall system consists of a number of components that work together to meet the RA objectives for the area as a whole. The barrier wall system components are described below, based on information provided in E&E, 2001, and clarification provided by EPA (listed below).

#### Barrier Wall

The soil-bentonite barrier wall is 2,040 feet long and encompasses an area of 6.05 acres. Previous documents reported the barrier wall area as 4.6 acres (E&E, 2001); however, CH2M HILL has calculated an area of 6.05 acres from the 2001 as-built survey provided by EPA which delineates the centerline of the barrier wall. The depth of the barrier wall between the ground surface and the top of the siltstone ranges from 14 to 20 feet. The siltstone beneath the TLT site functions as an aquitard. The barrier wall is keyed into the siltstone to minimize seepage along the bottom of the wall. The depth of the key is 2 feet into the siltstone or to the point of refusal. The barrier wall was designed to be between 30 and 36 inches wide (E&E, 2001). Contractor submittals dated August 23, 2000 (Geo-Con), indicated that the wall would be constructed to a minimum width of 30 inches, which was confirmed by the EPA on-scene coordinator, Mike Sibley. The backfill soil consisted of a mixture of bentonite and clean off-site soil such that the permeability of the wall was designed to be less than $1 \times 10^{-7}$ cm/sec.

#### Protective Cap

A protective cap was installed over the top of the barrier wall to protect the wall from heavy equipment traffic. The cap consists of base aggregate a minimum of 30 inches thick by 8.5 feet wide. An additional 2.5 feet of width were added to the as-built cap with a 1:1 slope on the side walls, for a total minimum cap width of 13.5 feet (see Figure 2-6). The base and walls of the cap trench were covered with a low permeability (specified at $4 \times 10^{-12}$ cm/sec) geosynthetic clay liner that was overlain by a subgrade stabilization geotextile, which in turn was overlain by the compacted base aggregate. The asphalt cap was constructed over this protective cap.

### Asphalt Cap

The existing asphalt cap extends slightly beyond the barrier wall and protective cap (in most locations), covering a total of 6.75 acres. Of that area, existing structures cover approximately 1.44 acres, and 0.21 acres are concrete. The asphalt cap serves to impede the infiltration of stormwater into the groundwater beneath the area encompassed by the barrier wall and protect people from direct contact with contaminated soils. However, the cap is centrally located in the PWPO facility and is frequently driven over by heavy equipment. Therefore, to remain intact and serve its primary purpose, the cap must be designed to successfully sustain active use without damage. The existing cap design consisted of a 2-inch-thick base course and a 2-inch-thick wearing course, and the design indicated that the wearing course would be over a minimum gravel base of 18 inches. Pavement testing has been conducted to confirm the specifications of the existing cap in order to correctly design a new cap. The results of 10 pavement cores completed in July 2006 indicate that the existing asphalt thickness ranges from 3.6 to 6.0 inches (average of 4.8 inches) with aggregate base thickness ranging from 1 to 14 inches (average of 8.8 inches). The variable thickness of aggregate base could have contributed to numerous locations where the asphalt cap has failed since it was installed in 2000.

### Groundwater Extraction System

Four 6-inch-diameter groundwater extraction wells with pneumatic pumps were installed within the barrier wall to induce an inward hydraulic gradient and to prevent the water level from rising above the protective cap. PWPO estimates that the total groundwater recovery rate can be as high as 360 gallons per day, depending on the season. The groundwater discharge pipes and air supply pipes are routed underground (24-inch minimum depth) to the closest wastewater receiving tanks or sumps and air supply outlets at the site, where it is conveyed to the existing SWTS.

Control of the groundwater elevation within the barrier wall is important to ensure the structural stability of the asphalt cap, and must be regularly monitored. If the groundwater elevation rises too close to the surface (for example, because of a leaking water line or a malfunctioning extraction pump), the weight-bearing capacity of the surface diminishes and the cap can fail under the heavy loads used in the area.

## 2.9.2 Outside the Barrier Wall

The remediation area outside of the barrier wall consists of in-place contaminated surface soil and ditch soil, in addition to stockpiled soil as a result of prior interim actions at the site. Each of these soil areas is described in detail below.

### Stockpiled Soil

The stockpiled soil in the northwest corner of the facility consists of three lined storage cells and one additional small side-pile[1] (Final Design Drawing C-6). The cells were constructed in July – October 2000 and include a perimeter berm for containment, an HDPE bottom

[1] The soil in this small stockpile originated during construction of the outbuilding east of the retorts in 2002. This soil will be used by PWPO to backfill the swales near the SWTS consistent with EPA's *Allowance for Beneficial Reuse of Excavated Soil* dated September 16, 2002.

liner, and an HDPE cover. The documentation in the RA report (E&E, 2001) describes the Cell 1 berm as 2.5 feet high and the Cells 2 and 3 berms as 5 feet high, with a slope of 1 (vertical) to 2 (horizontal) on both sides and lined with a 20-mil HDPE liner (see Detail 1 on Final Design Drawing C-18). The liner was anchored by approximately 2 feet of clean soil on top of the berm. A gravel access road was constructed lengthwise across Cells 1 and 2.

In July 2005, EPA conducted an interim action excavating approximately 140 cubic yards ($yd^3$) of soil from ditches on the east side of Rock Creek Road. An access ramp was constructed on the south side of Cell 2, and the soil from the ditch excavation was placed on top of a small portion of Cell 2. The pile was then covered with a plastic liner and anchored with weights.

The volume of each of these storage cells was estimated using a digital terrain model (DTM) and aerial photogrammetry obtained from the 2006 field survey (CH2M HILL, 2006a) and are summarized in Table 2-1.

TABLE 2-1
Soil Storage Cell Volume Estimates
*Taylor Lumber and Treating Superfund Site*

| Cell | Total Volume ($yd^3$) | Volume of Clean Soil in Berms and Road ($yd^3$) | Estimated Contaminated Soil Volume ($yd^3$) |
|---|---|---|---|
| 1 | 6,080 | 1,280 | 4,800 |
| 2* | 8,240 | 3,140 | 5,100 |
| 3 | 6,040 | 2,990 | 3,050 |
| **Totals:** | **20,360** | **7,410** | **12,950** |

* Includes the 140 $yd^3$ of soil from the 2005 ditch excavation.

Several issues regarding the construction of the soil cells were investigated during a July site visit and revealed the following:

- The access road across Cells 1 and 2 appeared to be constructed on top of the HDPE liner.
- The widths of the berms (toe-to-toe) are assumed to be 25 feet for Cell 1 and 35 feet for Cells 2 and 3.
- The cells do not appear to be separated by a berm or any type of divider. The division between cells is delineated by fence posts and yellow caution tape.

Photos provided in the Removal Action Report (E&E, 2001) show evidence that a lined berm separating Cells 2 and 3 was constructed, but it is not clear from the photographs whether Cells 1 and 2 are also separated by a lined berm. Carl Kitz, EPA's On-Scene Coordinator, has stated that the berms were constructed using clean import fill.

The contents of Cell 2 were inspected during the July visit, and again in August. It appears that air-drying of the soil and/or mixing with surrounding soil will be sufficient for excavation and disposal.

### Surface Soil

In-place contaminated surface soil that will be addressed as part of this RD is located in the following areas:

- Contaminated soil in Treated Pole Storage Area 1 (TPS-1) = 2.36 acres and Treated Pole Storage Area 2 (TPS-2) = 1.57 acres. The TPS-1 area encompasses the 2.04 acre paved area, as well as 0.32 acres surrounding the pavement that is contaminated with arsenic concentrations greater than 159 mg/kg.
- Contaminated soil in the White Pole Storage Area (WPS)= 0.4 acre

These areas are shown on Figure 2-7. The soil sample locations and data that were used to define these areas are presented in Appendix A.

A 2.04-acre asphalt concrete (AC) cap was installed in the northwest portion of the TPS Area in October 2000 (within TPS-1). The cap was installed as an interim action to prevent exposure to arsenic-contaminated surface soil. The sub-base for the AC pavement consists of approximately a 2-foot lift of 25-millimeter (mm), 0-mm base aggregate over the previously existing ground surface. The area is graded with a 0.5 percent slope toward the south to an existing drainage ditch, where it is conveyed to the SWTS conveyance system. The AC paving consists of a 2-inch base course and a 2-inch wear course for an overall depth of 4 inches.

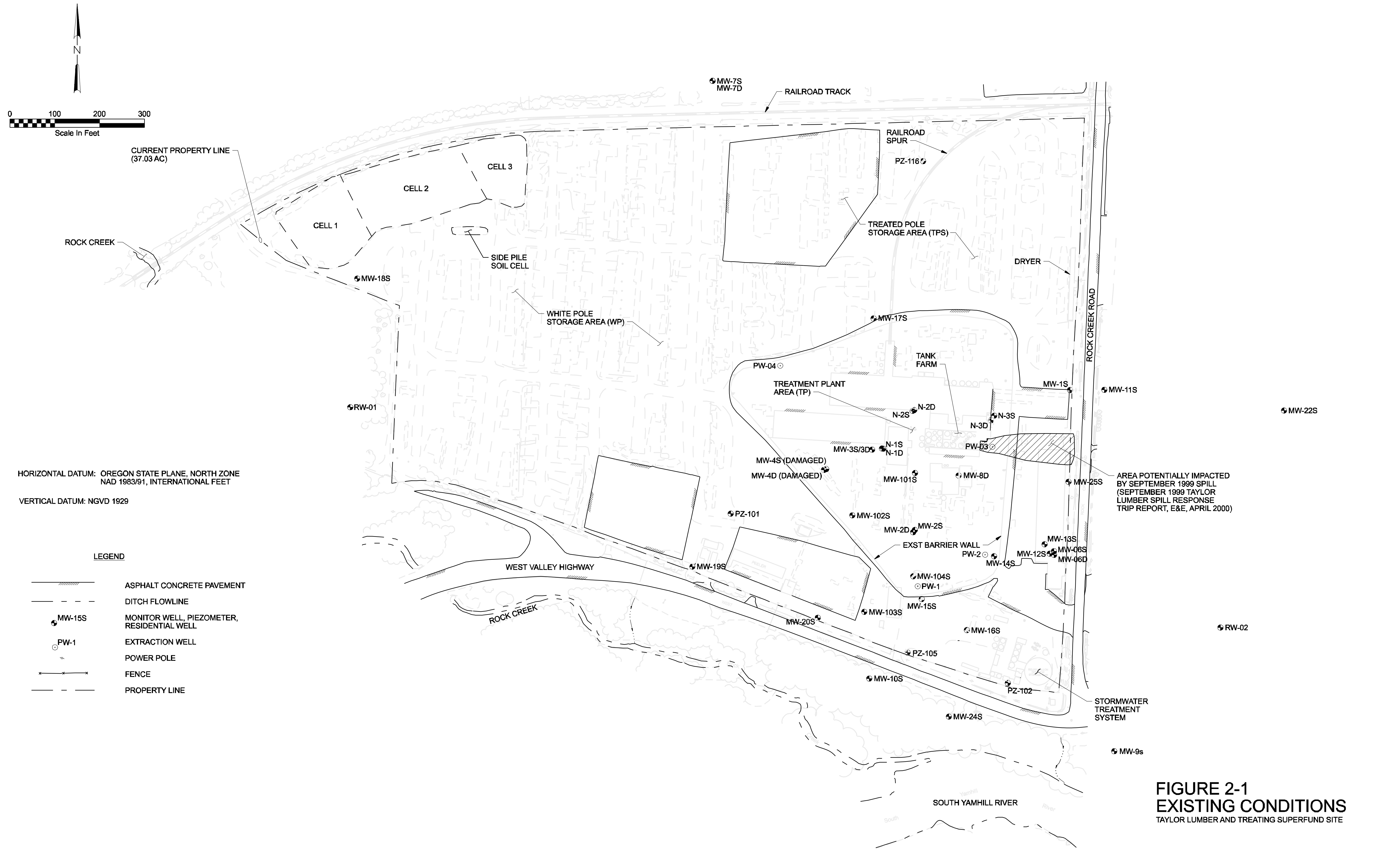
Surface soil in the southeast corner of the TP Area was resampled in July 2006 to verify arsenic levels. Results showed that arsenic concentrations are within background levels, and EPA decided that this area should not be included in the RA.

### Ditches

Approximately 3,890 linear feet of in-place contaminated ditch soil will be addressed as part of this RA, as shown in Figure 2-7. Most of the ditch length is adjacent to the site, including the railroad ditch western and eastern segments adjacent to the north edge of the Facility property (RRD-W and RRD-E), the ditch along Rock Creek Road (RCRD) and the ditch along Highway 18B (HWYD).

### Gullies

The culvert outlets of the two gullies, one leading south from the site to Rock Creek (RCG) and one to the South Yamhill River (SYRG), will be excavated from the culvert outlet to 10 feet downslope. The remainder of the RCG (10 feet downslope of the outlet to Rock Creek) will also be excavated (see Figure 2-7). The remainder of the SYRG (10 feet downslope of the outlet to the South Yamhill River) will not be excavated based on the results of characterization samples collected in August 2006 (CH2M HILL, 2006h).




# FIGURE 2-1
# EXISTING CONDITIONS
TAYLOR LUMBER AND TREATING SUPERFUND SITE

Fig2-1_342790.dgn 10/18/2006

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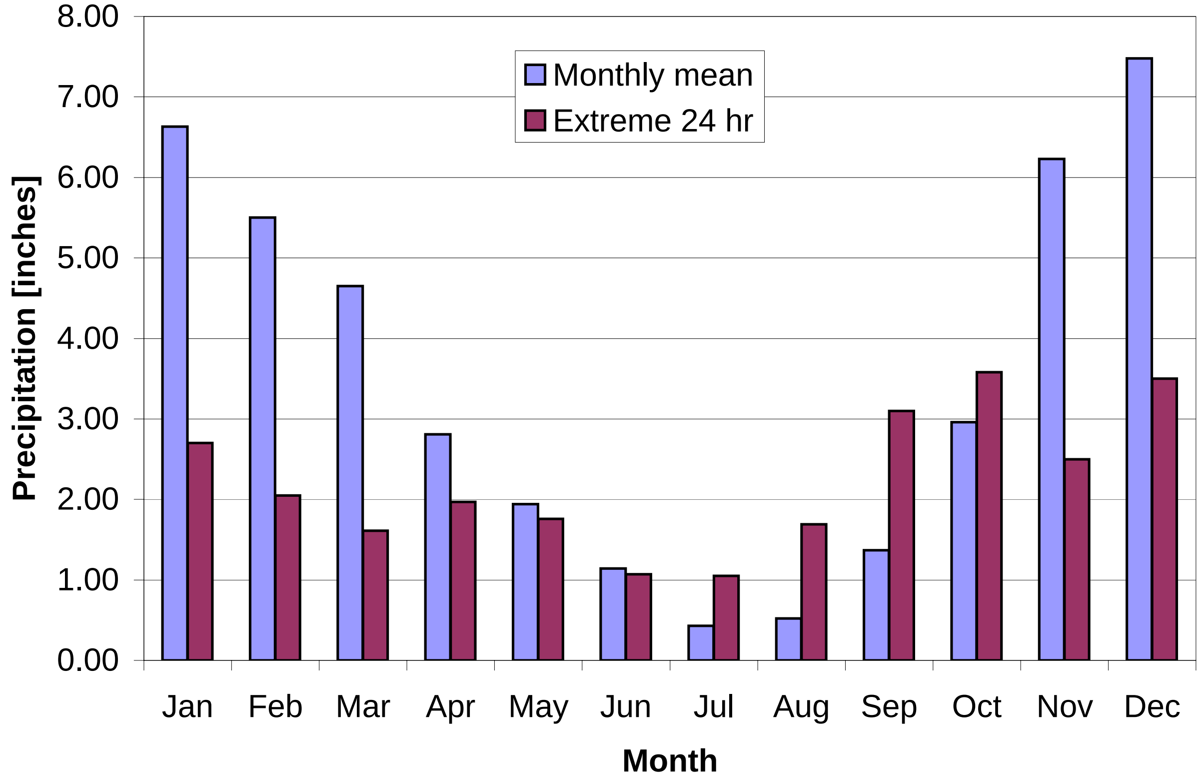
CVO\063330099




| Precip. (inches) | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Monthly mean | 6.63 | 5.50 | 4.65 | 2.81 | 1.94 | 1.14 | 0.43 | 0.52 | 1.37 | 2.96 | 6.23 | 7.48 | 41.66 |
| Extreme 24 hr | 2.70 | 2.05 | 1.61 | 1.97 | 1.76 | 1.07 | 1.05 | 1.69 | 3.10 | 3.58 | 2.50 | 3.50 | 2.70 |

FIGURE 2-2
Average Monthly Rainfall for McMinnville, Oregon (1971-2000).
From Oregon Climate Service (http://www.ocs.oregonstate.edu/index.html)
*Taylor Lumber and Treating Superfund Site*

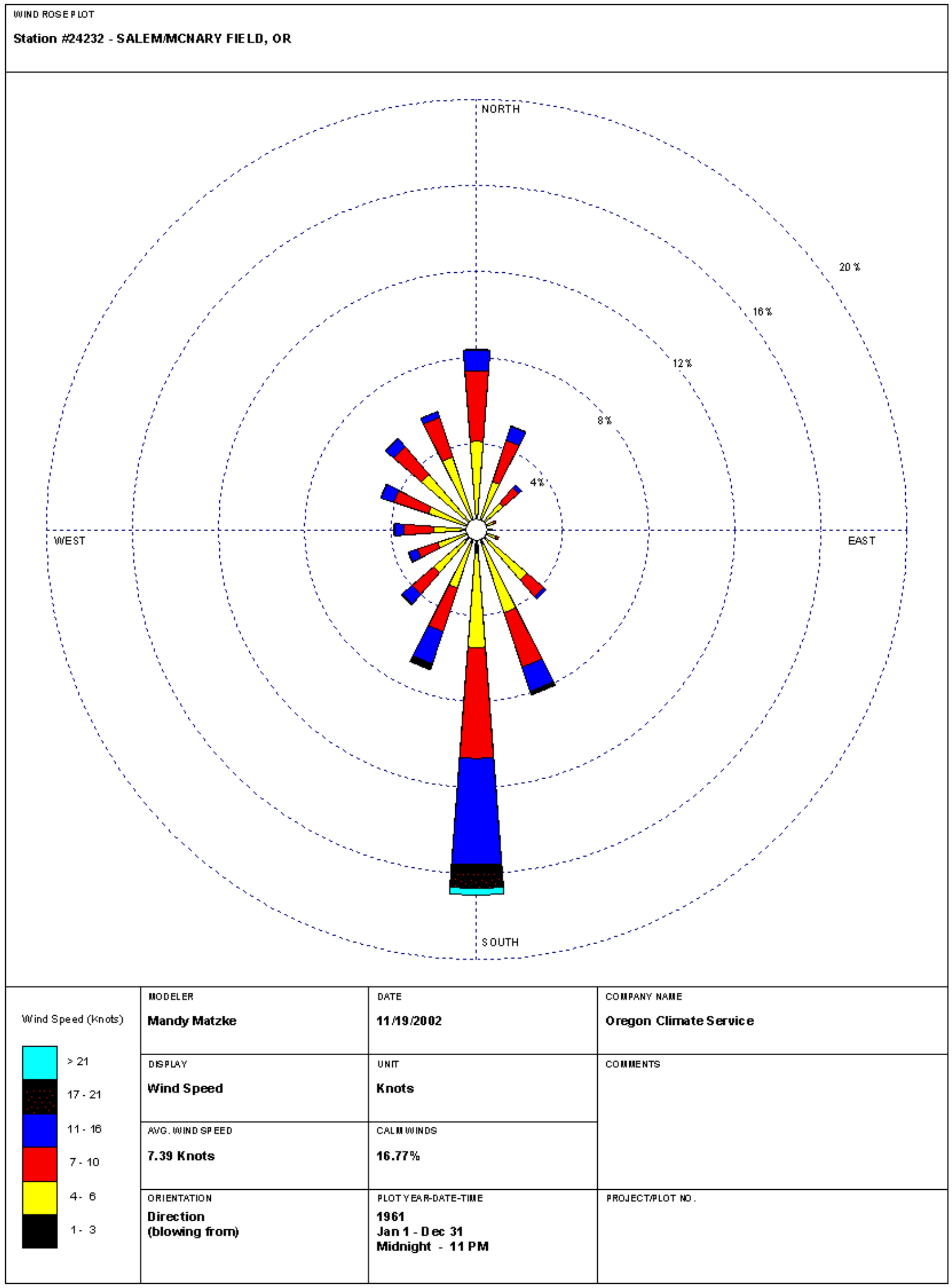



FIGURE 2-3
Wind Rose Patterns 1961-1990 for Salem, Oregon
From Oregon Climate Service (http://www.ocs.oregonstate.edu/index.html)
*Taylor Lumber and Treating Superfund Site*

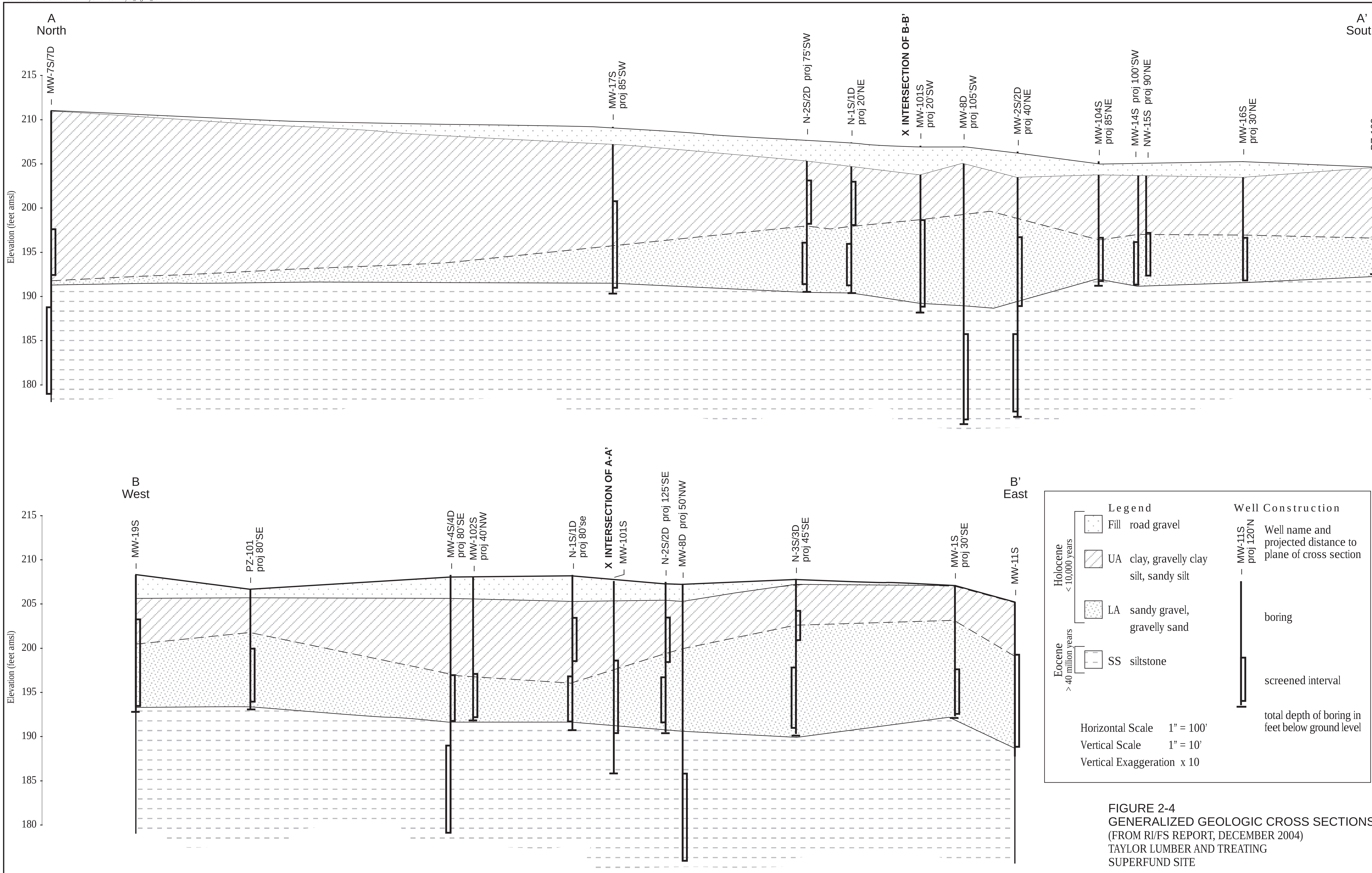
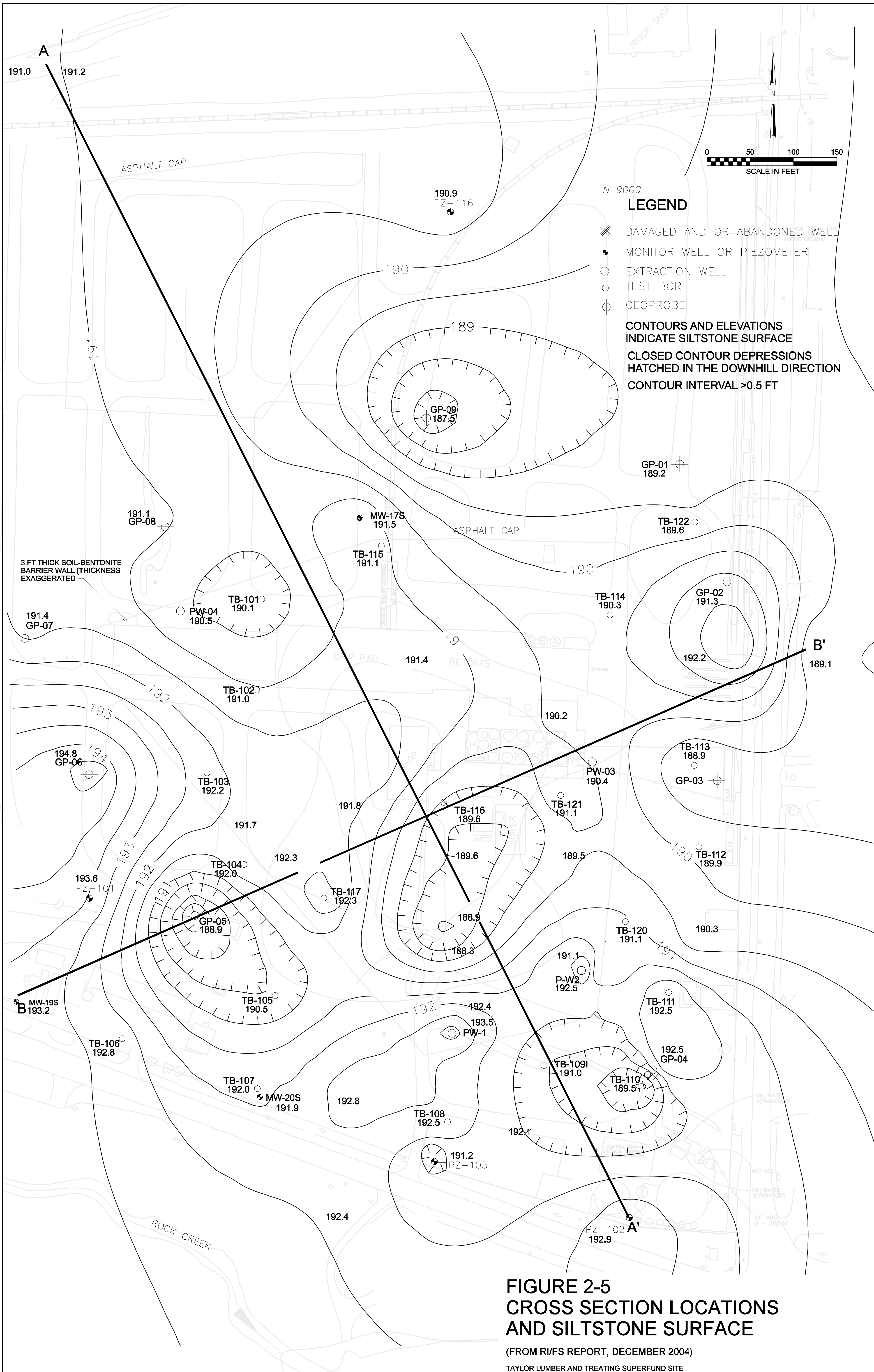



FIGURE 2-4
GENERALIZED GEOLOGIC CROSS SECTIONS
(FROM RI/FS REPORT, DECEMBER 2004)
TAYLOR LUMBER AND TREATING
SUPERFUND SITE

CH2MHILL




# FIGURE 2-5
# CROSS SECTION LOCATIONS AND SILTSTONE SURFACE

(FROM RI/FS REPORT, DECEMBER 2004)

TAYLOR LUMBER AND TREATING SUPERFUND SITE

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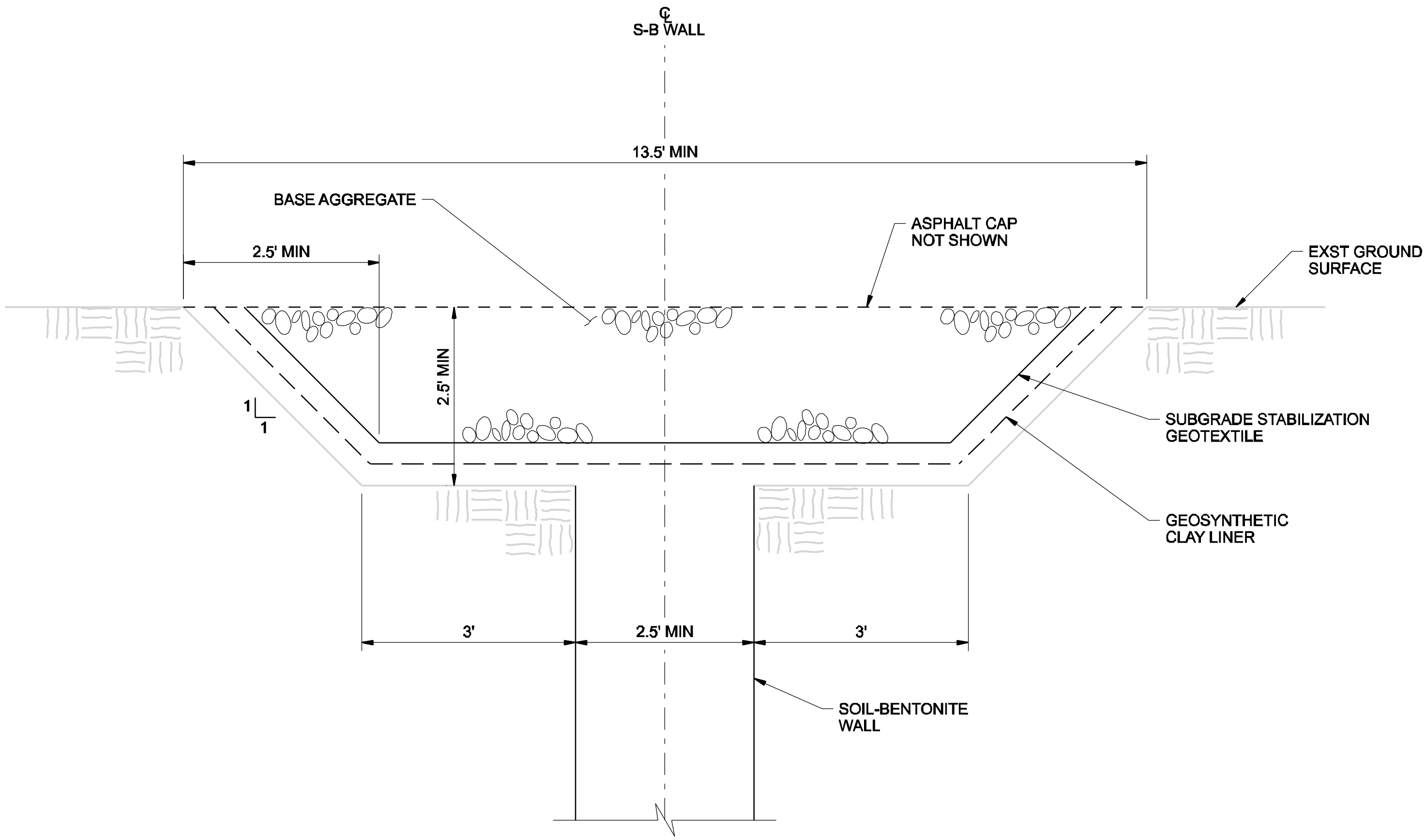


FIGURE 2-6
BARRIER WALL PROTECTIVE CAP DETAIL
TAYLOR LUMBER AND TREATING SUPERFUND SITE

14-JUL-2006 figx-x_342790.dgn

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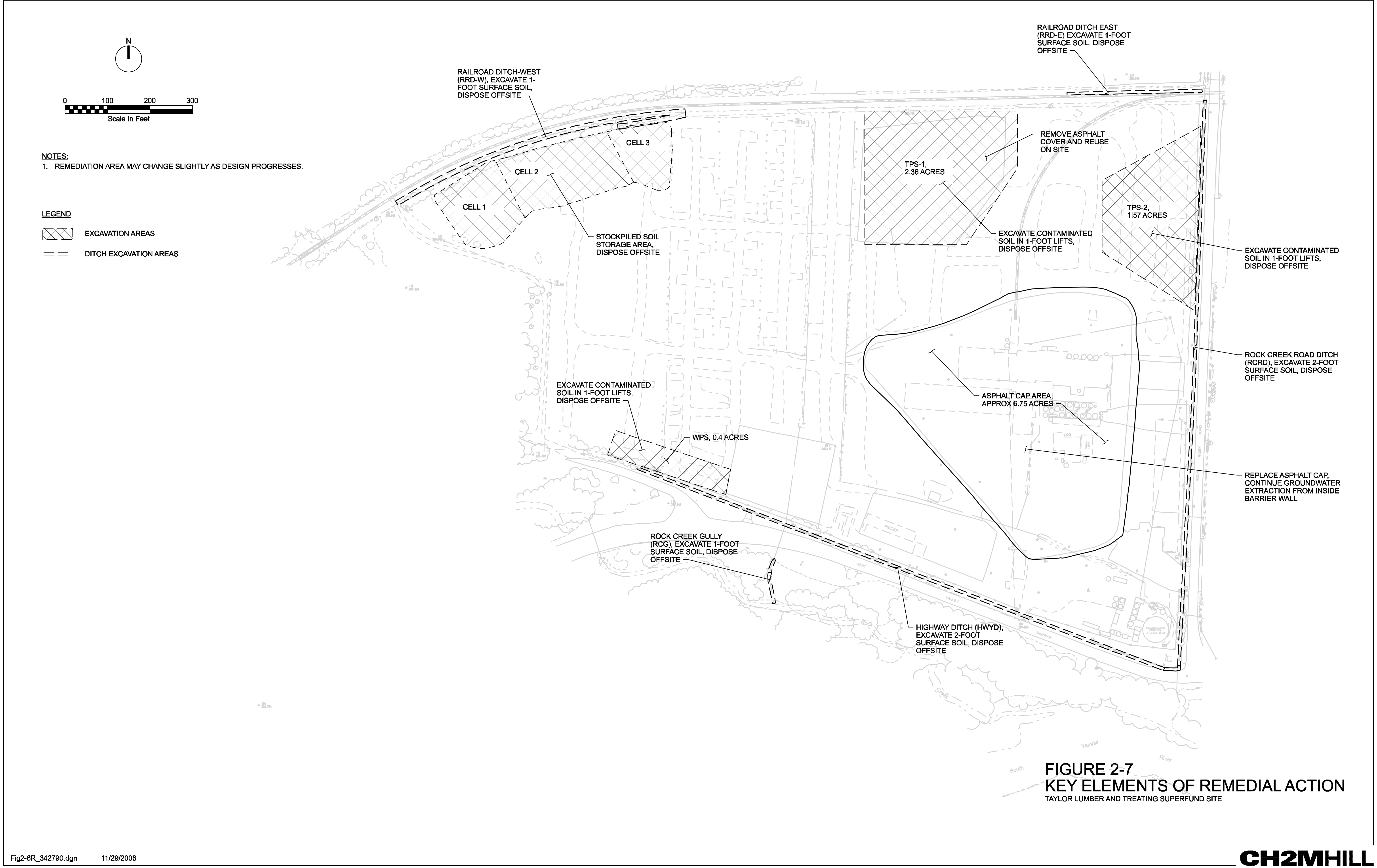


FIGURE 2-7
KEY ELEMENTS OF REMEDIAL ACTION
TAYLOR LUMBER AND TREATING SUPERFUND SITE

Fig2-6R_342790.dgn 11/29/2006

CH2MHILL

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# 3.0 Design Requirements

SECTION 3

# 3 Design Requirements

This chapter presents a description of the TLT remedial action project as presented in the ROD (EPA, 2005) and the RI/FS Report (CH2M HILL, 2004). The purpose of this chapter is to identify specific criteria necessary for remedial design.

## 3.1 Remedial Action Objectives

The remedy at TLT will be designed and constructed to achieve the following RAOs:

1. Prevent migration of the DNAPL and contaminated groundwater beyond the barrier wall.
2. Reduce or eliminate human exposure through direct contact (incidental soil ingestion, skin contact with soil, and inhalation of dust) with soils that exceed 159 milligrams per kilogram (mg/kg) for arsenic.
3. Reduce or eliminate risks to ecological receptors from contaminated soils in ditches.
4. Restrict human exposure to groundwater with contaminant concentrations that exceed 1 microgram per liter (µg/L) for PCP both inside and outside the barrier wall.
5. Minimize future migration of contaminated groundwater to adjacent surface waters (Rock Creek, South Yamhill River) to protect ecological receptors.

The remedial design described in this report addresses the first three RAOs listed above. The RAOs for groundwater outside the barrier wall will be addressed in a later design.

The ROD recognized that human health risk from exposure to soil in the TPS Area is driven by arsenic and dioxin. Because of the greater number and better distribution of arsenic data, the extent of the remedial action will be determined by arsenic contamination and cleanup level. A cleanup level for dioxin was not set in the ROD. Because dioxins are co-located with arsenic in this area, it follows that the remedy will also address dioxin contamination.

Likewise, dioxin cleanup levels were not set for ditch and gully soils. Given the relatively small volume of ditch and gully soils, EPA will remediate the entire ditch lengths adjacent to the facility along Highway 18B and Rock Creek Road and the RCG, and not spend additional time and funds to define specific cleanup areas and cleanup levels for dioxins. Post-cleanup data will be collected to ensure that arsenic levels are achieved in the ditches and RCG indicating that all depositional soil originating from the facility has been removed. EPA will select an arsenic cleanup level for the ditches and RCG prior to construction.

## 3.2 Description of Selected Remedial Alternative

The selected remedy presented in the ROD will achieve RAOs #1 to #3 by improving or replacing the existing asphalt cap over the barrier wall, maintaining hydraulic control of the

DNAPL inside the barrier wall through continued operation of the groundwater extraction system, excavation and offsite disposal of arsenic contaminated soil, Institutional Controls (ICs), O&M, and long-term monitoring. Figure 2-7 shows the locations of the remediation areas for the site.

Excavation of contaminated soils will include three surface soil contamination areas (TPS-1, TPS-2, and WPS), four drainage ditch segments (RRD-E, RRD-W, RCRD, and HWYD), the gully leading from Highway 18B to Rock Creek (RCG), and soil storage cells 1, 2, and 3.

Backfill of excavated areas and finished site grades shall be designed and constructed with due consideration given to traffic volumes, loads and traffic patterns of the existing onsite wood-treating operations, as contemplated by the Prospective Purchaser Agreement with PWPO.

The existing 6.75-acre asphalt cap area, which covers the barrier wall, will be improved to a more durable low-permeability cap. The area contains approximately 5 acres of asphalt with existing buildings and concrete providing the remaining cover. The engineered asphalt cap will be designed and constructed with due consideration given to onsite wood-treating operations. The cap will reduce the potential for direct contact with underlying contaminated soils, and minimize the rate of rainfall infiltration.

Operation and maintenance of the barrier wall system will be continued, including extraction and treatment of groundwater from within the barrier wall. Groundwater extraction provides hydraulic containment to prevent contaminants from migrating beyond the barrier wall and to lower water levels to ensure the structural integrity of the overlying cap. Groundwater will continue to be treated in the existing onsite stormwater treatment system and discharged pursuant to the existing ODEQ National Pollutant Discharge Elimination System (NPDES) permit.

ICs will be implemented to reduce the potential for human exposure to contaminated soil and groundwater. The ICs are necessary to ensure that the use of the site remains industrial, that the caps are maintained in place for protection of current and future onsite workers, and groundwater is not used.

## 3.3 Design Criteria

The primary design criteria are those specified in the ROD and FS, with some minor differences as noted, and are described in the following subsections. The current design described in this report (and associated submittals) only addresses the construction portions of the remedy and I&M related to the existing asphalt cap. It does not address ICs, O&M for the SWTS and groundwater extraction system, or long-term groundwater monitoring

### 3.3.1 Barrier Wall and Groundwater Extraction System

To meet the requirements of RAO #1, the integrity of the soil-bentonite barrier wall will be preserved and operation of the groundwater extraction system will be continued.

### 3.3.2 Asphalt Cap

To meet the requirements of RAO #2, the selected remedy for the area inside the barrier wall includes the design criteria in the following subsections.

- The asphalt cap currently in place over the barrier wall will be overlaid with a more durable, low permeability engineered asphalt cap, achieving at or below $1 \times 10^{-8}$ centimeters per second (cm/sec). The new asphalt overlay will require that the existing pavement is repaired to eliminate damaged areas or cracks which could cause reflection cracking in the new asphalt overlay. This will also require reconstruction of the existing subbase and asphalt to provide sufficient strength to support equipment loads on the new asphalt overlay in severely damaged or high traffic areas.
- The thickness of the low permeability asphalt to be added over the existing asphalt will be sufficient to have a design life of 20 years based on current equipment use and loading. Log and lumber loading equipment and tractor/trailer equipment are actively used to move materials on the asphalt surface. The FS assumed that the thickness of the low permeability asphalt to be added over the existing asphalt will be 4 inches, per vendor recommendations, resulting in a total asphalt thickness of 8 inches. The design pavement cross-sections are based on current loading scenarios and falling weight deflectometer (FWD) testing data.
- Portions of the existing cap that are damaged or found to have insufficient weight-bearing capacity from the FWD testing will be roto-milled to a depth of 12 inches (5 inches of asphalt and 7 inches of subgrade), mixed with a concrete binder, and compacted prior to adding the new asphalt overlay.
- The new engineered asphalt cap will be installed over the existing and/or repaired base and sloped so that all the stormwater runoff is captured by the SWTS conveyance system. Pavement will be brought as closely as possible to building foundations.
- The two open drainage ditches in the southern portion of the paved area will be filled in, paved over, and graded to match the surrounding areas. The Final Design includes installation of trench drains to convey the stormwater that formerly flowed through these ditches to the SWTS. In addition, the culvert crossing the barrier wall at the easternmost open drainage swale appears to have failed due to equipment traffic, causing uplift of the pavement and culvert at the inlet. This culvert will be removed and replaced by extending the trench drain to the limit of the pavement.
- PWPO has indicated that a leaking water line may be causing the asphalt to fail near asphalt sampling location 18. Apparently, PWPO shuts off the water line from the area near the office buildings (at the hydrant) because they suspect that the line that flows from there to the area near MW-3S may be leaking (potentially near the northern fire hydrant). This issue should be addressed before the 2007 construction season.
- During the remedial action, construction worker health-related risks will be minimized through air monitoring and use of emission control techniques such as dust suppression. Short-term noise and traffic congestion impacts in the community will be controlled through work schedules and use of transportation routes that avoid residential areas.

### 3.3.3 Soil Storage Cells

- EPA is working to attain a "contained-in" designation for Cell 1, 2, and 3 soils. If successful, these soils will be disposed at Riverbend Subtitle D Landfill. The Cell 3 soil will be screened prior to disposal and the coarse gravels will be used onsite for backfill.
- A section of the existing berm on the northern side of the soil storage cells will be left in place to minimize stormwater flow to the adjacent RRD-W ditch.
- Approximately 6 inches of existing soil will be removed from beneath the soil storage cells and disposed at a Subtitle D landfill.
- The storage cell area will be graded to provide proper drainage and turned over to PWPO. Gravel surfacing or revegetation of this area will not be part of the construction contract.

### 3.3.4 Soil Removal and Disposal

The selected remedy for the surface soil, ditches, and gullies includes the following design criteria:

- The existing 2.04-acre asphalt cap (4 inches thick) at TPS-1 will be ground up and removed with the associated aggregate sub-base material (24 inches thick). These materials will be stockpiled for use as backfill to meet necessary grades after excavation of contaminated soils.
- The TPS-1, TPS-2, and WPS, areas will be excavated in 1-foot lifts. Screening samples (between lifts) will be analyzed for arsenic with a field portable x-ray fluorescence (XRF) analyzer[2] to determine whether it is necessary to remove additional material. Final confirmation samples will be analyzed in a laboratory to achieve more accurate and defensible results. Residual arsenic levels must be below 159 mg/kg for onsite soil. Excavation quantity estimates are shown in Table 3-1 assuming a 2-foot excavation depth.
- The RRD-E and RRD-W ditches and RCG gully will be excavated to a minimum depth of 1 foot and the RCRD and HWYD ditches will be excavated to 2 feet at the centerline, with the exception of the westernmost 275 feet of the HWYD, which will be excavated to a minimum depth of 1 foot across the entire ditch cross-section. This will eliminate most if not all site-related deposition. Screening samples will not be collected from the ditches or gully; however, confirmation samples will be analyzed for arsenic (as detailed in Appendix C). While dioxin is the contaminant of concern in the ditches, it is co-located with elevated arsenic levels. Arsenic can be analyzed very quickly and inexpensively, while dioxin has a lengthy and expensive turn-around time. EPA will select an arsenic concentration which will indicate that all deposition from the facility has been removed as part of the remedial action. Quantity estimates are shown in Table 3-1.
- Selected portions of the excavated soil described above will be dry-screened, to separate gravel and fines. The fine soil produced by the screening will be taken to the Subtitle C Landfill in Arlington, Oregon, without treatment or delisting by either the 2002

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[2] The feasibility of XRF will be validated with onsite test samples (see Appendix C).

Corrective Action Management Unit (CAMU) amendments or achieving alternative treatment standards [below 10 times the universal treatment standard (UTS) levels]. The separated gravel will be used as backfill onsite provided it contains less than 5 percent fines (passing a #200 sieve) by weight. If the gravel is found to contain excess fines it may be taken to Riverbend Subtitle D landfill for disposal.

- Excavated areas onsite will be backfilled with imported and screened granular fill and compacted to support equipment loads.
- Steps will be taken to control erosion during excavation of the ditches and gullies to prevent sediment from impacting Rock Creek and the South Yamhill River. The ditches and gullies will be backfilled with erosion protection rock to prevent soil erosion. Erosion control rock will be placed to a depth required to re-establish proper drainage within the ditches by providing a uniform slope to match the flow line elevations of existing culverts. This will likely require that erosion protection rock be placed thicker than would be required for erosion protection alone, but will eliminate the need of backfilling, grading, and compacting a lift of soil within the ditches prior to placement of the rock.
- Additional erosion protection rock will be added to a portion of ditch on the east side of Rock Creek Road where water does not currently drain properly after previous site related excavation and backfill construction.
- The existing stormwater conveyance system and French drains will be repaired and/or replaced if damaged during excavation.
- The grade of the existing railroad spur leading to the treatment plant and rails leading into and out of the dryer will be maintained, and runoff will be directed away from the tracks to prevent stormwater infiltration beneath the tracks. In order to provide a smooth transition for traffic crossing the rail spur, a portion of the existing asphalt cap will need to be milled down and tapered. This will create a small area that will drain toward the tracks and then to the sump located in the creosote unloading building.
- During the RA, construction worker health-related risks will be minimized through air monitoring and use of emission control techniques such as dust suppression. Short-term noise and traffic congestion impacts in the community will be controlled through work schedules and use of transportation routes that avoid residential areas.

### 3.3.5 Soil Screening

As a cost saving measure, the remedial design includes dry screening of excavated soils to reduce the volume of material disposed at offsite landfills. Separating coarse granular material (gravel) from fine-grained material (sand, silt, and clay) will reduce the overall volume of soils hauled offsite. It is believed that contaminants are in large part limited to the fine-grained fraction of soils. The course granular material screened out will be used as onsite backfill once the fine-grained material has been removed. The suitability of the coarse granular fraction for reuse as onsite backfill is dependent upon the percentage of fine-grained materials removed. A design criteria of removing fine-grained soils such that no greater than 5 percent by weight passes a No. 200 sieve has been set for this remedial action.

Success of the dry screening operation will depend upon careful observation of the excavated material to determine suitability for screening. Factors that will influence the success of the screening operation include moisture content, fraction of fine-grained materials, and presence of organic matter, wood debris, trash, or other objectionable materials. Based on these criteria, Table 3-2 provides a recommendation for which soils should be screened, proposed screen sizes, and anticipated percent retained and passing.

TABLE 3-1
Excavation Quantities
*Taylor Lumber and Treating Superfund Site*

| Soil Removal Area | Assumed Excavation Area (acres) | Excavation Volume (cubic yards)[1] | Excavation Mass (tons)[2] |
|---|---|---|---|
| TPS-1 | 2.36 | 7,694 | 10,792 |
| TPS-2 | 1.57 | 5,130 | 7,182 |
| WPS | 0.4 | 1,330 | 1,864 |
| **Ditches and Gullies** | **Assumed Excavation Length (feet)** | **Excavation Volume (cubic yards)[3,4]** | **Excavation Mass (tons)[2]** |
| RCG | 140 | 114 | 160 |
| RRD-E | 320 | 151 | 211 |
| RRD-W | 890 | 732 | 1,025 |
| RCRD | 1,350 | 800 | 1,120 |
| HWYD | 1,330 | 788 | 1,103 |
| | **Total** | **16,739** | **23,457** |

Notes:

1 Assumes an excavation depth of 2 feet.

2 Assumes a density of 1.4 tons/cubic yard.

3 Assumes an excavation depth of 1 foot in railroad ditches and gullies, and 2-foot excavation depth at centerline of the road ditches.

4. Excavation volume estimates for the HWYD are conservative because excavation of the westernmost 275 feet of ditch will only be to a depth of 1 foot.

TABLE 3-2
Soil Screening Estimate
*Taylor Lumber and Treating Superfund Site*

| Excavation Area | Assumed Excavation Depth | Total Volume | Screening (Yes/No) | Screen Size | Assumed % Retained[1] | Volume Retained (to Onsite Backfill) (CY) | Volume Passing (to Offsite Disposal) (CY) | Total Volume to Offsite Disposal (CY) | Screening Rationale |
|---|---|---|---|---|---|---|---|---|---|
| **Surface Soil Areas** | | | | | | | | | |
| TPS-1 | 2 | 7,694 | No | -- | -- | 0 | 0 | 7,694 | Higher arsenic concentrations have been observed in TPS-1 (up to 1,590 mg/kg or 10x the CUL) and the likelihood of higher moisture content due to the overlying asphalt cover and aggregate base. Screening is not recommended because the potential for fine-grained materials with high arsenic concentrations to adhere to the coarse-grained screenings is higher due to the moisture content. |
| TPS-2 | 2 | 5,130 | Yes | 1/2" | 49 | 2514 | 2,616 | 2,616 | The percentage of coarse-grained soil is expected to be high in this area. Due to lower arsenic concentrations (< 2x UCL), screening is recommended. |
| WPS | 2 | 1,330 | Yes | 1/2" | 49 | 652 | 678 | 678 | The percentage of coarse-grained soil is expected to be high in this area. Lower arsenic concentrations are expected (< 2x UCL), and screening is recommended. |
| **Ditches and Gullies** | | | | | | | | | |
| RRD-W | 1 | 732 | Yes | 1" | 30 | 220 | 512 | 512 | Due to low concentrations of arsenic and presence of fines mixed with railroad ballast, coarse screening is recommended. The fraction of ballast and rock removed is expected to be lower since excavation of ballast must be minimized to protect integrity of track structure. |
| RRD-E | 1 | 151 | Yes | 1" | 30 | 45 | 105 | 105 | Due to low concentrations of arsenic and presence of fines mixed with railroad ballast, coarse screening is recommended. The fraction of ballast and rock removed is expected to be lower since excavation of ballast must be minimized to protect integrity of track structure. |
| RCRD | 2 | 800 | Yes | 1" | 30 | 240 | 560 | 560 | Due to low concentrations of arsenic and presence of fines mixed with rock/riprap, coarse screening is recommended. |

TABLE 3-2
Soil Screening Estimate
*Taylor Lumber and Treating Superfund Site*

| Excavation Area | Assumed Excavation Depth | Total Volume | Screening (Yes/No) | Screen Size | Assumed % Retained[1] | Volume Retained (to Onsite Backfill) (CY) | Volume Passing (to Offsite Disposal) (CY) | Total Volume to Offsite Disposal (CY) | Screening Rationale |
|---|---|---|---|---|---|---|---|---|---|
| HWYD | 2 | 788 | No | -- | -- | 0 | 0 | 788 | Observations of the Highway ditch do not indicate significant presence of rock for erosion protection. The fraction of material retained from screening is likely to be low. Screening is not recommended. |
| RCG | 1 | 114 | No | -- | -- | 0 | 0 | 114 | Observations of the Rock Creek Gully indicate that the gully is largely made up of native soils. The fraction of material retained from screening is likely to be low. Screening is not recommended. |
| EPA Ditch Soil Pile | -- | 140 | Yes | 1” | 30 | 42 | 98 | 98 | Due to presence of larger rock and riprap in portions of the ditch, some fines may be mixed with the rock during removal. Screening is recommended to remove any fines from the excavated rock. |
| **Soil Storage Cells** | | | | | | | | | |
| Cell 1 | -- | 6,080 | No | -- | -- | 0 | 0 | 6,080 | Due to higher silt and clay content, the presence of some tree bark in the cell, and a failed past attempt at screening Cell 1 soils (E&E, 2001), screening is not recommended. |
| Cell 2 | -- | 4,960 | No | -- | -- | 0 | 0 | 4,960 | Due to moisture content and likelihood of larger fraction of bentonite slurry and fine-grained soils from deeper excavation of barrier wall trench, and high moisture content, screening is not recommended. |
| Cell 3 | -- | 6,040 | Yes | 1/2” | 49 | 2,960 | 3,080 | 3,080 | Cell 3 soils from Barrier Wall protective cap construction (excavation depth 0 to 2.5 ft bgs); the course-grained fraction is expected to be high (similar to other onsite surface soils), and screening is recommended. |

Notes:

[1] Average percent retained based on grain size analysis of surface soil samples collected during the Phase 1 RCRA Facility Investigation (Maul Foster & Alongi, 1997).

# 4.0 Design Basis

SECTION 4

# 4 Design Basis

The major elements of the RA include mobilization, site preparation and environmental controls, soil excavation and handling, verification sampling, grading and cover, cap installation, site restoration, and I&M. The following subsections present CH2M HILL's approach for implementing the design in accordance with the design criteria presented in Section 3.3.

## 4.1 Contractor Mobilization

RA contractor (Contractor) mobilization activities will include preparation and submittal of site-specific plans, setup of decontamination facilities and temporary office space, and delivery of materials handling equipment to the TLT site.

Site-specific plans to be prepared by the Contractor will include:

- Site Management Plan. This plan will provide information on the Contractor's overall work approach, construction sequencing, dust control, decontamination methods, and equipment, and will integrate by reference the plans described below. This submittal will also include the Contractor's preliminary construction schedule.
- Construction Health and Safety Plan (HSP). This plan shall describe health and safety procedures specific to Contractor-performed work.
- Erosion and Stormwater Control Plan (ESCP). This plan will describe equipment and procedures used by the Contractor to control and manage stormwater in accordance with Oregon Storm Water Construction General Permit—1200-C requirements. Note that the existing onsite SWTS can potentially be used to treat stormwater runoff during construction activities.
- Air Quality Monitoring Plan. This plan will describe air monitoring activities and work practices to minimize ambient air impacts (fugitive dust emissions) from construction activities, including proposed air quality monitoring program, equipment, methods, frequency, duration, and reporting. Contractor air quality monitoring should follow the general requirements outlined in the air monitoring approach provided in Appendix D.
- Soil Excavation, Grading, and Backfill Plan. This plan will describe the Contractor's methods and procedures for excavating contaminated soils, segregating soil requiring disposal or screening, and placement of backfill materials. Specific details regarding Contractor work approaches within the railroad ditches, roadway ditches, and gullies shall be provided in this plan.
- Soil Screening Plan. This plan will include a description of soil screening methods, location of material stockpiles, proposed screening equipment and layout, dust control equipment, and quality control testing laboratories and procedures.

- Soil Disposal and Transportation Plan. This plan shall include transport methods for offsite disposal; number, size, and type of transport vehicles; Transporter's qualifications; and proposed disposal facilities.
- Asphalt Pavement Plan. This plan shall describe the Contractor's work approaches and procedures for asphalt pavement patching and repair, pavement reconstruction, and low- permeability asphalt pavement overlay. The plan shall include details of sequencing and scheduling and interface with PWPO operations.

The Contractor's site-specific plans will be provided to EPA and the RA Oversight Contractor (Engineer) for review and approval before any mobilization, site preparation, or construction activity begins. Copies of site-specific plans will also be provided to PWPO as needed. Because onsite CERCLA response actions are exempted from federal, state, or local permits, the Contractor will not be required to obtain a construction stormwater permit for onsite work. However, the Contractor is required to follow best management practices (BMPs) for stormwater management during construction as described in Section 4.2.

Mobilization will include transportation to the site and staging, if necessary, of all equipment, materials, and supplies required to complete the work.

CH2M HILL anticipates that the Contractor will set up two office trailers near an existing power and tap water source, in a location approved by PWPO. The Contractor will use the first trailer, while the second will be available for use by the Engineer, EPA, and state representatives.

Prior to initiating the work, the Contractor will document the condition of Rock Creek Road along the east property boundary from the truck entrance to the site to the intersection with West Valley Highway (Oregon Hwy 18B). During onsite work, the Contractor will maintain the roads in equal condition and make provisions for traffic control when trucks are entering or leaving the site.

A photographic and/or video survey of the proposed work areas should also be conducted to document the existing condition of site features. This survey is recommended to document existing conditions to facilitate site restoration to pre-existing conditions.

Survey control points will be established and documented prior to the start of intrusive work. The proposed work limits should be surveyed and staked prior to the start or work, and all critical utilities, wells, and other structures within those proposed work limits or adjacent to proposed access routes should be adequately located and marked so that they are clearly visible to equipment operators. Temporary barriers will be erected as needed to protect sensitive areas.

The construction schedule will be prepared and maintained throughout work activities to assure substantial completion by the target construction completion date.

## 4.2 Site Preparation

Site preparation activities will include identifying work and non-work areas, vegetation removal and disposal, moving any stored lumber or equipment located in work areas, and removing the existing liners over the Soil Storage cells.

### 4.2.1 Identification of Work Limits

Because PWPO actively performs wood treating operations at the TLT site, special coordination with PWPO will be required when identifying the limits of work and non-work areas. It is likely that in certain areas, work may be limited to specific times and days of the week. It is expected that the following areas will be identified as non-work areas, or will at least have restricted periods when work can be performed:

- Areas required by PWPO in daily operations. These include the office and parking area, car and truck entrances, loading and unloading areas, wood treating areas, and lumber storage areas.
- WPRR right-of-way. Work in this area can be performed only with a WPRR flagger onsite.

Underground utilities located during the 2006 site survey are provided in the design drawing for the Contractor's reference. However, these areas will not be designated as non-work areas, and it will be the Contractor's responsibility to field-locate all utilities within the designated work areas during the mobilization phase.

Special care will be taken when excavating around utilities (for example, hand-digging). Excavation approaches should be coordinated with each utility owner to ensure protection of both the utilities and construction workers. Any utilities damaged or destroyed will be repaired or replaced by the Contractor at no expense to EPA.

Existing structures will be protected during construction. Due to the shallow depth of excavation, the use of shoring is not anticipated; however, care should be taken not to disturb or undermine the foundations of buildings or structures adjacent to excavation areas.

### 4.2.2 Site Access

The majority of onsite work areas currently have sufficient access points to support construction activities. Access to offsite ditches is sufficient; however, it is expected that access improvements will be required to complete work in the gullies leading to Rock Creek and the South Yamhill River. The Contractor will be responsible for identifying areas needing access improvements, prior to remediation, and the measures to be utilized to improve access to these areas.

### 4.2.3 Environmental Controls

The Contractor will use engineering measures for control of dust, stormwater, erosion and equipment decontamination as necessary during all excavation, hauling, placement and loading/unloading operations. Environmental controls shall be in place prior to any intrusive work in contaminated areas.

#### Dust Control

Dust controls will be designed to suppress visible dust above limits specified in the Contractor's HSP and Air Quality Monitoring Plan. The Contractor will be responsible for applying a suppressing agent (clean water or other approved agent) on all work and transportation surfaces, stockpiles, and in the stabilization area in accordance with a preventive schedule contained in the Contractor's Site Management Plan. The Contractor may be required to perform fugitive dust monitoring, if visible dust is observed during performance of the work.

Ambient air monitoring will be conducted to demonstrate and document that off-site levels of arsenic-laden dust emitted during excavation and soil moving activities do not exceed National Ambient Air Quality Standards (NAAQS), or pose a threat to human health or the environment. The approach to be used for air monitoring is described in Appendix D; a detailed sampling protocol will be written by the oversight contractor.

### Stormwater Management

The Contractor's ESCP, prepared in accordance with Oregon Storm Water Construction General Permit—1200-C requirements, will describe BMPs to be employed for stormwater management, erosion control, and work area stabilization. A stormwater permit is not required; however, the substantive requirements of the permit should be followed. The existing onsite SWTS can potentially be used to treat stormwater runoff during construction activities.

Stormwater BMPs may include, but are not limited to:

- Scheduling, including performing work in sensitive areas during dry periods (July 1 through September 1) to reduce runoff potential. This requirement is particularly applicable to construction in the ditches and gullies.
- Runoff controls, including temporary berms and ditches to direct stormwater run-on away from active remediation areas and to direct stormwater runoff from remediation areas to the SWTS conveyance system.
- Erosion prevention methods, including protection of existing vegetation to minimize impact, use of erosion control barriers, phasing of construction to avoid leaving exposed inactive areas prior to backfill with granular material or establishing vegetative cover, covering stockpiled soils to minimize contact between rainfall and contaminated soils, and maintaining temporary erosion control measures until vegetative cover is established or granular backfill is placed.
- Peripheral erosion and sediment controls, including silt fence installed around all active construction areas and soil stockpiles and at storm drain inlets to prevent sediment discharge.
- Sediment containment booms and silt curtains installed in Rock Creek and the South Yamhill River may be required for excavation activities in the gullies leading to these water bodies.
- Sediment tracking reduction measures, including gravel or paved surfaces at each exit from the construction site, wheel washes to prevent tracking of soils onto roadways, and avoiding trucking of saturated soils that may drip onto roadways.

### Equipment Decontamination

A temporary decontamination pad will be constructed in each area, or in a central location, prior to beginning the work. Contaminated equipment will be decontaminated by washing with steam or high-pressure water until visible traces of soil are removed. Decontamination water will be collected and discharged to the onsite SWTS or treated by the Contractor before discharge. The decontamination area should also have secondary containment and/or temporary storage tanks for retention and potential testing of decontamination water. Equipment traffic patterns in work and non-work areas should be coordinated to minimize the amount of traffic in contaminated areas. Wheel washes should also be used at each exit from the construction site to minimize sediment tracking onto roadways.

### 4.2.4 Vegetation Clearing and Disposal

The site preparation plan also shows areas where vegetation clearing will be required. These areas will correspond predominantly to the ditches and gullies leading south to the creek/river.

Vegetation clearing will consist of removing brush and small trees only as required to complete work. Larger trees will be preserved for aesthetic reasons. Grassy vegetation will be included with the soil during excavation. All cleared, woody vegetation will be cut into pieces or chipped and disposed of at the municipal landfill.

### 4.2.5 Removing Soil Storage Cell Cover

The Soil Storage Cell covers must be removed prior to excavation of the soils in the cells. The cover should be decontaminated by removing any excess soil residue prior to disposal with other non-contaminated construction debris. The soil cover will be removed as soon as possible in the construction sequence to allow drying of soils stockpiled prior to excavation. All storage cell liner and cover material will be disposed as non-hazardous, solid waste.

### 4.2.6 Owner Responsibilities and Coordination

Prior to the start of construction activities, coordination with PWPO is required to minimize impacts to site operations and allow remediation activities to proceed without delays.

The Contractor shall coordinate with PWPO to identify acceptable work hours, suitable staging areas, access routes for hauling materials and equipment, material stockpile locations, and the potential for conducting construction activities during scheduled plant maintenance shutdown periods or times of low production, when feasible.

Prior to construction, it will be necessary to move any stored lumber and equipment from the proposed work limits. Coordination with PWPO will be required. It is assumed that PWPO will be responsible for moving lumber and equipment from the work areas prior to construction. The Contractor is responsible for notifying PWPO prior to commencement of construction activities in each area.

## 4.3 Excavation, Material Handling, and Disposal

The Contractor's site-specific plans will describe methods for excavating contaminated soils, transporting soil from the excavation or stockpile to the screening equipment, drying procedures for saturated soils, and transport and disposal at an offsite facility.

### 4.3.1 Excavation

In general, excavation activities at the site include excavating surface soils to a maximum anticipated depth of 3 feet in selected areas. Because of the shallow depth of excavation, sloping and shoring will not generally be required to complete excavation activities.

#### Excavation Methodology

The primary objective for excavating contaminated soils is to remove material exceeding the cleanup level while minimizing the volume of soil necessary for offsite disposal. To achieve this objective, excavation will proceed using a phased approach employing field screening sampling to verify that the excavation will meet the cleanup level.

This approach will employ a construction sequence where soil is excavated in 1-foot lifts followed by collection of screening samples for testing by use of a field portable XRF analyzer to guide the excavation (detailed discussion of soil sampling and analysis is provided in Appendix C). The excavation should be sequenced to allow adequate time to verify with screening samples that cleanup levels have been achieved before final confirmation samples are collected and sent to an offsite laboratory. If the screening samples indicate that the cleanup levels have not been met, another 1-foot lift of soil will be excavated from areas corresponding to the screening sample locations that failed to meet the cleanup level. This sequence will be repeated until the screening samples indicate that cleanup levels have been achieved, at which point confirmation samples will be collected and sent to an offsite analytical laboratory.

The excavation areas will be subdivided into “cells” to allow the Contractor to complete excavation of a single lift of soil from the cell and then move on to the next cell while screening samples are collected and analyzed. The size of the cells will be determined by the processing time of the field screening data and the rate of excavation so that work can continue in other cells while the screening samples are analyzed to determine if additional excavation is required.

This approach will allow the Contractor to work in each cell in succession and then return to a cell if screening samples indicate further excavation is required. Careful sequencing is required to avoid down time while decisions are made regarding the need for further excavation.

#### Excavation Areas

The proposed excavation areas include both onsite surface soils and offsite ditch and gully soil. Each of the excavation areas is described below, along with preliminary concerns and constraints for excavation in these areas. Excavation areas are shown in Figure 2-7.

**Stockpiled Soil**. Stockpiled soils in the three Soil Storage Cells located in the northwest corner of the site will be removed and disposed of offsite. Prior to disposal the existing HDPE cover will be removed and disposed. The soils in Cell 2 will be dewatered to meet landfill acceptance criteria (no free water). After soils have been removed from each cell, the bottom liner will be removed and disposed. Approximately 6 inches of surface soil from under the bottom liner will be removed and disposed and the subgrade will be graded as necessary to provide adequate site drainage and minimize future ponding and erosion.

**Treated Pole Storage Areas 1 and 2**. The TPS-1 area is located in the north-west portion of the TPS. Excavation of contaminated soils in TPS-1 will require that the existing pavement be ground up and stripped along with the gravel base course. These materials will be removed and stockpiled at an approved location while excavation of the underlying contaminated soils proceeds. These materials will then be used as backfill to meet existing grades and promote proper drainage by limiting ponding and directing stormwater runoff to the stormwater conveyance system.

Excavation of the TPS-2 area, located on the east side of the TPS, should proceed according to the methodology presented above.

No underground utilities have been identified in TPS-1 or TPS 2; however, the existing French drains along the north and east perimeter of the TPS may be impacted. The French drains should be repaired or replaced as needed upon completion of excavation activities. Culverts located in these areas should also be protected or modified to maintain adequate drainage. The above ground steam line located along the eastern fence line north of the dryer is no longer active and should not require special attention. Above- and belowground portions of the steam line south of the dryer are still active and must be protected.

The dryer and associated rails located in the TPS-2 area present a challenge for completing excavation. Conversations with PWPO staff indicate that the dryer cannot be moved. It is assumed that excavation will proceed as close as practical to the dryer and rail system without damaging or undermining the equipment foundation. Careful excavation using specialized equipment or hand excavation may be required to maximize the amount of contaminated soils that can be removed.

**White Pole Storage Area**. This excavation area is located at the south central portion of the WPS. No utilities have been identified in this area. Excavation in this area should proceed according to the methodology presented above.

**East and West Railroad Ditches**. The RRD-E and RRD-W areas will be excavated to remove contaminated soils. Work within the railroad right-of-way will require an Environmental Right-of-Entry Agreement with WPRR and may require payment of a fee. All work within the railroad right-of way will require a railroad flagger to be present during construction activities. Excavation deeper than 5 feet would require shoring to ensure stability of the railroad track and bed. It is anticipated that excavation in the railroad ditch will only include surface soils to 1-foot depth only and that shoring will not be necessary. Any railroad ballast removed should be replaced to meet original grade.

The RRD-W area will be flagged or staked by the Engineer to delineate the extent of proposed excavation since the ditch cross section is not uniform. This will provide the contractor with information needed to complete the excavation. The RRD-E is a steeper and narrower ditch and will require removal of material from the bottom of the ditch and a portion of the side slopes. Appropriately sized erosion protection rock will be placed in both ditches to restore the original slope and flow line of the ditches.

**Rock Creek Road and West Valley Highway Ditches**. Excavation of the roadway ditches will require work within the road right-of-way. Oregon Department of Transportation (ODOT) and Yamhill County will be notified prior to the start of work within the right-of-way. Road signage and flaggers will be required to control traffic during construction. Excavation equipment will most likely operate from the roadway or shoulder, and would likely require lane closures during work hours. Excavation of the gravel shoulders of the roadway is not anticipated; however, any damage or disturbance of the shoulder will be repaired by the Contractor.

Existing utilities in these areas include above ground power lines, a buried sanitary sewer and water lines along the northern edge of Highway 18B, a buried natural gas line along the southern edge of Highway 18B, and a buried sanitary sewer line near the western edge of Rock Creek Road. Care must be taken during excavation to avoid damage to these utilities.

In addition to soil removal in the ditches, the culverts will be cleaned out, as well as the immediate area downslope of the culvert discharges (approximately 10 feet down the centerline of the ditch), to ensure that all contaminated soils have been removed.

**Rock Creek and South Yamhill River Gullies**. Evidence of major flooding suggests that historical data may not represent current conditions in the gullies leading from the site to Rock Creek and the South Yamhill River. Additional samples collected in August 2006 revealed that contaminant levels remain elevated in RCG but not SYRG. Therefore, the full length of RCG will be excavated as part of this RA. Only the discharge area (10 feet from the outlet of the culvert under the West Valley Highway) will be excavated in the SYRG.

Excavation in these gullies presents several challenges to site access as well as to protection of the water bodies. Access to the gullies from the West Valley Highway is not adequate to conduct construction activities. Access to the gullies will need to be improved and may require brush removal to provide clearance to complete the work. The Contractor will be required to select appropriate equipment and work approaches to limit disturbance and removal of existing vegetation to only those areas required to complete the work. Erosion and sediment control BMPs will be required to minimize the potential for release of contaminated stormwater and sediments to the waters of the state. These measures may include working during the dry season, use of silt fence, temporary berms, containment booms or sediment curtains.

Several abandoned PVC fire water lines are present in the South Yamhill River Gully. The property owner, (b) (6), has requested that these lines remain intact. Cleaning of the culvert outlet in this location will require these lines to be protected from damage.

### Excavation Near Utilities

Excavation activities near above and below grade utilities should be conducted with extreme caution to avoid damage to the utilities and to protect the construction crews. Prior to starting any intrusive activities, the Contractor must verify utility locations within each work area. Prior to work within the easement for each utility, the Contractor shall verify the requirements for working within the easement with the utility owner. The utility owner should be notified in advance of all construction activities in the vicinity of the utility, particularly if location or shutdown of a utility may be required.

In general, the shallow excavation depth (0 to 3 feet) will limit impacts to buried utilities; however, burial depths should be verified by the Contractor before digging. Prior to installation of the low-permeability overlay in the barrier wall area, utility and culvert depths below the existing asphalt cap should be verified wherever excavation or roto-milling is planned.

Excavation and backfill requirements and techniques for work performed near buried utilities will be verified with each utility owner. Excavation methods may include probing, potholing, using smaller equipment, hand excavation, and excavation parallel to the alignment of the utility rather than perpendicular.

If excavation in the pipe zone is necessary, temporary support of utilities may be required and could include temporary blocking to support the pipe. Backfill requirements in the pipe zone should be verified with the utility owner, but may include use of a flowable fill material.

Work around above ground utilities should also be approached carefully. Equipment clearance beneath overhead utilities should be monitored and a spotter used in proximity to overhead lines. Safe working distance from overhead utilities should also be observed.

In general, relocation of utilities is not anticipated. Utility relocation is not recommended unless absolutely necessary, because of cost implications. No major utility conflicts have been identified during design basis development.

The Contractor is responsible for replacing or repairing any utilities damaged during construction.

#### Asphalt Piles

Asphalt debris piles from maintenance repairs on the existing barrier wall asphalt cap have been placed in an area between the retort unloading concrete pad area and the existing asphalt cap over the TPS-1 area.

CH2M HILL inspection of the debris piles in September 2006 indicated that the asphalt debris primarily consists of large-diameter pieces (up to 18 inches) mixed with some aggregate base material that was excavated along with the asphalt during patching operations. CH2M HILL believes that the material is not suitable for reuse as backfill because of the size of the asphalt debris. It cannot be determined from visual inspection whether the excavated gravel base material was the clean base material placed when the asphalt cap was constructed, although the asphalt borings conducted by CH2M HILL in July 2006 indicate that the aggregate base material that underlies the barrier wall asphalt cap averages just under 9 inches thick, with additional gravel underlying the aggregate base. Because of the thickness of clean aggregate base beneath the asphalt cap, it is unlikely that the asphalt debris or excavated aggregate base material has come into contact with underlying contaminated soils. However, because of this uncertainty, the asphalt debris piles should be removed. PWPO will remove these piles prior to the start of construction; however, the piles are outside of the proposed work limits of this design and completion of this removal should not impact RA construction activities.

### 4.3.2 Soil Screening

Dry soil screening will be conducted to separate coarse-grained materials and fine-grained materials from selected areas that are suspected to contain a high proportion of gravels. This operation will require stockpiling contaminated soils prior to the screening operation, as well as stockpiling segregated materials after screening. Fine-grained materials will be disposed offsite.

During the excavation process, the Engineer will observe excavation activities to determine the suitability of materials proposed for screening. Materials with high percentages of fine-grained soil, wood debris, trash, or other objectionable material should be segregated from soils being removed to the screening stockpile. These rejected soils should be disposed at an offsite landfill facility.

Screening equipment will need to be selected and sized to match production rates of excavation and backfill activities in order to minimize potential delays to the overall project. Dust control measures must also be implemented to manage fugitive dust emissions from the screening equipment and soil stockpiles. The contractor will not be permitted to use water for dust control in the screening operation because increased moisture content could adversely affect the quality of the end products. Dust control equipment such as a baghouse should be used to manage dust emissions.

### 4.3.3 Soil Drying and Stabilization

Cell 2 soils contain high moisture content, and will likely require some form of drying or stabilization prior to landfill disposal. Any free liquid must be removed from the soil to meet landfill waste acceptance criteria. CH2M HILL started an investigation of the Cell 2 soils in late July 2006 to assess the condition of soils in Cell 2 and determine the best method to dewater the soil. A portion of the cover was removed to observe the condition of the soil, and to determine to what degree the soil will dry before the fall.

Indications were that the soils will dry naturally and will not require water removal or use of a reagent to stabilize the soils. The most likely approach will be to remove the HDPE cover early in the dry season to allow the soils to start drying. The access road along the centerline of Cell 2 is firm and should support excavation equipment. Standard excavation equipment could be used to drag the moist soils from the soft areas up onto firmer areas where they can be spread thinly and allowed to dry more rapidly. Single or multiple pieces of equipment could be used to work up and down the centerline of Cell 2, mixing and spreading the moist soils to promote drying. As each layer of soils dries, it would then be excavated and hauled off for disposal, followed by spreading another lift of moist soils. Mixing with drier soils will be permitted if the soils are classified for the same disposal methods (Subtitle D) and the soils are not proposed for screening.

### 4.3.4 Water Treatment and Management

Waste water from remedial activities (e.g., decontamination water) will be stored onsite in an appropriate tank until it can be pumped to the SWTS for treatment and discharge. Due to scheduling of the work for the dry season, the flat topography of the site, and through implementation of adequate runon/runoff controls, significant quantities of stormwater runoff requiring collection and treatment are not anticipated. The contractor will be responsible for ensuring proper use of stormwater controls, and arranging for collection and treatment of stormwater runoff if produced.

### 4.3.5 Field Screening and Confirmation Sampling

During construction, field screening samples will be collected to guide the excavation of contaminated soils to achieve cleanup levels. It is anticipated that field screening samples will be analyzed with a field portable XRF. Detailed information on the number of samples, sample location, and collection and analysis procedures is provided in the draft Soil Sampling and Analysis Plan, which is included as Appendix C.

After excavation is completed, confirmation samples for arsenic will be collected to verify that all soil with arsenic exceeding cleanup levels has been removed. If a confirmation sample shows arsenic concentrations above the cleanup level for arsenic, a new estimate of cut elevation and excavation volume will be made based on the degree of exceedance.

### 4.3.6 Soil Disposal

It is assumed for this design that Soil Storage Cell 1, 2, and 3 soils will achieve a "contained-in" determination and will be disposed of at the RCRA Subtitle D Riverbend Landfill. All other soils will be disposed of at the RCRA Subtitle C facility in Arlington.

### 4.3.7 Backfill and Grading

Once confirmatory sampling has demonstrated that cleanup levels have been achieved, the excavated areas will be filled with clean crushed rock. Backfill and grading activities will include:

- Backfill and compaction of crushed rock to support equipment loads in traffic areas
- Regrading the areas to match surrounding grade and to minimize ponding, promote proper drainage, and in consideration of PWPO requirements to maintain current use of site areas.
- Placement of erosion protection rock in drainage ditches to restore the flow line elevation of the ditches to match the invert elevations of existing culverts. In the uppermost 275 feet of the HWYD and the flat portions of the RCG, soil backfill will be placed and these areas will be seeded to establish vegetation.

Fill material for use in backfill in the TPS-1, TPS-2, and WPS areas will be obtained from screened gravel and excavation of the existing asphalt and sub-base from TPS-1. Additional fill will be purchased from a local vendor as necessary to meet finished grade. All backfill materials for the ditches and gully locations will be purchased from a local vendor. The final thickness and backfill surface elevation will be verified by pre- and post-construction surveys.

## 4.4 Asphalt Cap

### 4.4.1 Existing Cap Repair and Reconstruction

Prior to design and construction of the asphalt cap, predesign sampling was required to verify the condition of the existing pavement and subgrade. These tests were required to optimize the cap cross-section in order to ensure adequate design life and the ability to support the equipment loads. These tests were conducted in August 2006 and included

Falling Weight Deflectometer (FWD) testing on a 50-foot grid to determine whether undamaged areas of the existing asphalt cap have sufficient strength to support the new low permeability engineered asphalt cap (GeoDesign, 2006). Borings were also conducted at 10 locations to determine the subgrade conditions with California Bearing Ratio (CBR) testing. Asphalt cores were also collected at each boring location in order to verify pavement thickness at key locations and for resilient modulus testing. These testing results were used in the pavement design calculations to determine the appropriate pavement cross-section.

In areas where the existing asphalt has failed, and in the areas shown to be deficient based on predesign sampling and areas of heavy traffic loads and volumes, the existing cap and a portion of the base material will be reconstructed. Pavement reconstruction will consist of roto-milling the existing pavement and base aggregate, adding cement, and compacting it prior to overlaying the new impermeable asphalt pavement.

Areas with lower traffic loads and volumes and minor cracking or isolated damage will be patched prior to placement of the low permeability asphalt overlay.

### 4.4.2 Asphalt Cap

After damaged and deficient areas have been repaired, a more durable overlay of low-permeability asphalt will be installed. The overlay will require that finished grades are higher than existing grades. The new low-permeability overlay will be tapered or graded to match acceptable grades along building foundations. Hot and cold joints in the asphalt will be designed and constructed to maintain the overall permeability of the cap.

Near building entrances a fillet or curb section will be installed to direct stormwater flow away from the entrance or foundation. Risers will also be required to extend catch basins, monitor wells, and extraction well vaults to the new grade.

Paving operations will need to be carefully coordinated with PWPO because of the high likelihood of conflicts with ongoing site use during paving. If possible, paving operations should be scheduled for plant shutdowns or periods of low traffic in the paving areas.

After completion of the asphalt overlay, striping will be applied or painted on the asphalt surface to delineate the location of the barrier wall and protective cap centerline. The location of the barrier wall and protective cap will be based on the as-built survey which will be provided to the Contractor. If the barrier wall protective cap is encountered during construction, the actual location will be documented.

## 4.5 Demobilization and Site Restoration

Site restoration will include removal of the Contractor's and engineer's temporary facilities and rubbish. The Contractor will ensure the roads are in equal condition to that documented prior to initiating site activities, and will perform repairs, if necessary. Replacement or repair of any onsite or offsite facilities damaged or disturbed during construction will also be required to bring any disturbed areas back to pre-existing conditions.

Any temporary access roads and fencing will be removed. Temporary decontamination pads and decontamination water collection and treatment systems will be decontaminated and removed from the site. Silt fencing will also be removed after backfill has been placed, erosion control measures have been implemented, and vegetative cover has been established where specified.

## 4.6 Construction Sequencing and Duration

General work approaches and construction sequencing will need to be carefully coordinated with PWPO in order to ensure minimum impact to facility operations. They must also progress in a logical manner to take full advantage of Oregon's dry season to complete weather-sensitive operations prior to the wet season.

PWPO will need to remove stockpiled materials from the work areas prior to contractor activities. In order to minimize impact to PWPO operations, a sequential approach to excavation is recommended. Current site operations may not allow concurrent excavation of several areas at the same time. At this time, PWPO cannot accurately predict space limitations and changes to operations that may occur between the design and construction phases due to variability in their production rates.

PWPO has expressed that the TPS-1 Area is very important to PWPO's operations, and therefore would like to have a longer lead time for notification prior to taking the area out of service so that treated poles and lumber may be moved. Also, since this is disruptive to PWPO's operation, maintaining the projected construction schedule in this area is imperative. For these reasons, the Contractor should give consideration to scheduling excavation of TPS-1 as early as possible, and priority should be given when developing the construction sequence.

Similarly, placement of the asphalt cap overlay inside the barrier wall will most likely need to be carefully coordinated with work in the TPS-1 and TPS-2 areas to reduce impact to PWPO operations. Therefore, it is recommended that the asphalt paving be started earlier in the construction season since it may not be as sensitive to rainfall events as work in Cell 2, the ditches, or gullies. This is because the existing asphalt cap will cover contaminated soils while work occurs. The pavement repair and overlay operation may need to be done in smaller segments since the work area is in the heart of PWPO operations, and therefore may not be feasible to complete as a whole. One particular area of concern for sequencing paving operations is the loading and unloading area located directly west of the PWPO delivery entrance from Rock Creek Road. This area is used for loading and unloading of a majority of both untreated and treated wood products at the PWPO facility. Traffic volumes in this area increase as the work week progresses and peak on Friday when PWPO's main shipments are sent offsite. The Contractor should give consideration to scheduling work within this area between a Saturday and Monday time period to avoid peak traffic. The Contractor's overall approach and construction sequence should give consideration to minimizing impacts to PWPO operations while not incurring significant additional cost to EPA.

In general, double handling of materials should also be minimized during the construction sequence. For example, the asphalt cap and gravel sub-base must be removed from the TPS-1 area prior to excavation of contaminated soils. This material should be suitable for reuse as backfill; however, using this material as backfill in the TPS-1 area would require the material to be stockpiled while contaminated soils are excavated. After completion of contaminated soil excavation, the stockpiled asphalt and gravel would have to be moved from the stockpile. An alternate approach could include excavation of the TPS-2 area first, and after completion of excavation in TPS-1, start removal of the asphalt and gravel from TPS-1, which could then be directly placed as backfill at TPS-1.

A balance will need to be achieved between double handling of materials and work within multiple areas at the same time, particularly in the TPS-1 and TPS-2 areas, since PWPO will not be able to store treated poles and lumber in areas not previously used for these activities.

Work within the soil storage cells, RRD-E, RRD-W, RCRD, HWYD, RCG, and SYRG will all require careful planning and sequencing. Work in these areas should be completed during the dry season. CH2M HILL recommends planning these activities between July 1 and August 30. Ditches and gullies should be excavated from the upstream end proceeding to the downstream end to prevent recontamination of surface soils in the event of a storm event.

Based on the criteria discussed above, a preliminary construction sequence is outlined as follows:

1. Mobilize site trailers and equipment.
2. Improve primary and secondary site access routes.
3. Install erosion control, stormwater management and decontamination facilities.
4. Repair damaged asphalt cover and prepare sub-base for new asphalt overlay inside of barrier wall.
5. Install asphalt overlay inside barrier wall.
6. Remove HDPE cover from Soil Cell No. 2 and begin mixing/drying operation, and begin excavation and transport of stockpiled soils offsite (during dry period).
7. Remove HDPE cover from Soil Cells No. 1 and 3, excavate and transport soils offsite.
8. Begin soil screening operation in areas adjacent to the soil stockpile.
9. Clear TPS-1 area and remove asphalt and gravel sub-base.
10. Excavate TPS-1. Perform confirmation sampling and use stockpiled asphalt or screened gravel for backfill.
11. Excavate TPS-2 Area. Perform confirmation sampling and use stockpiled asphalt or screened gravel for backfill.
12. Excavate the WPS area. Perform confirmation sampling and use stockpiled asphalt or screened gravel for backfill.
13. Excavate RRD-E and RRD-W and place rock backfill (during dry period).
14. Excavate RCRD from North to South, clean culverts and place rock backfill.
15. Excavate HWY 18B ditch from upslope locations to outlet culverts, and clean out culverts.

16. Excavate RCG and SYRG from the upslope end, and place rock backfill.
17. Complete site Restoration and Demobilization.

A preliminary construction schedule was developed during the design (Figure 9-1); however, the Contractor is responsible for developing a construction schedule to be submitted in the site-specific plans. EPA requires that all construction activities be substantially completed prior to September 30, and therefore the Contractor's schedule should include sufficient time for a Prefinal Inspection, correction of punch list items, and a Final Inspection. Demobilization and minor site restoration activities may be allowed after September 30.

## 4.7 Quality Assurance and Quality Control

Quality assurance and quality control testing will be integral to the successful completion of the RA construction work. A Construction Quality Assurance Project Plan (CQAPP) is included with this report as Appendix E.

## 4.8 Inspection and Maintenance

A draft I&M plan for the asphalt cap has been prepared as a separate submittal.

## 4.9 Compliance with ARARs

CERCLA §121(d) specifies that onsite Superfund remedial actions must attain federal standards, requirements, criteria, limitations, or more stringent state standards determined to be legally applicable or relevant and appropriate (ARAR) to the circumstances at a given site. ARARs are identified during the RI/FS and carried forward during remedy selection and remedial design.

To be applicable, a federal or state requirement must directly and fully address the hazardous substance, the action being taken, or other circumstance at a site. A requirement, which is not applicable, may be relevant and appropriate if it addresses problems or pertains to circumstances similar to those encountered at a Superfund site. Although legally applicable requirements must be attained, compliance with relevant and appropriate requirements is based on the discretion of the Remedial Project Manager (RPM) planning and coordinating the response action.

The scope and extent of ARARs that may apply to a Superfund response action will vary depending on where remedial activities take place. For onsite response activities, CERCLA does not require compliance with the administrative requirements of other laws. However, CERCLA does require compliance with the substantive elements of other laws, such as chemical concentration limits, monitoring requirements, or design and operating standards for waste management units for onsite activities. Administrative requirements, such as permits, reports, and records, along with the substantive requirements, apply only to hazardous substances sent offsite for further management.

Federal and state ARARs for the selected remedy were set forth in Section 13.2 of the ROD. This section has been updated and is presented in Appendix B.

# 5.0 Design Optimization

**SECTION 5**

# 5 Design Optimization

In preparing the DBR, several design considerations were identified that could reduce the overall RA cost. These design optimizations are described in the following subsections.

## 5.1 Excavation and Confirmation Sampling Methodology

Soil excavation and confirmation sampling is likely the most significant area for optimization of the design. The competing objectives of ensuring that all soils above cleanup levels are removed from the proposed excavation areas and the desire to minimize the volume of excavation and offsite disposal present a challenge. To achieve the goal of ensuring that cleanup levels are met, confirmation sampling must be performed. Even with costly accelerated laboratory turnaround times, shipping confirmation samples to an offsite analytical laboratory for analysis increases the likelihood of delays in construction while results are awaited to verify that cleanup levels are met. A conservative excavation approach, based on excavating one single deeper pass prior to confirmation sampling, will likely lead to over-excavation and increased costs. Conversely, a less conservative excavation approach of shallow excavation prior to confirmation sampling may result in construction delays and increased sampling costs if cleanup levels are not achieved after each round of excavation and confirmation sampling.

To balance these objectives and more accurately guide excavation, field screening methods are useful to provide quicker results. Field screening samples using an onsite analytical laboratory or field portable XRF will likely improve turnaround time for sampling results and decision making during excavation. In the case of the XRF analyzer, more samples may be collected and analyzed so that finer control of excavation cut lines can be achieved to minimize over-excavation. The XRF analysis can be conducted in situ to provide near real-time results; however, the accuracy may be diminished significantly depending on site conditions (moisture content, fraction of granular material, and homogeneity of the soil sample).

Provided appropriate sampling methodology and procedures are followed, field screening methods can provide a valuable tool to guide the excavation to reduce the over-excavation of soils that meet cleanup levels, or under-excavation of contaminated soils requiring additional excavation and confirmation sampling and the resulting costs and delays.

The field screening and confirmation sampling approach presented in Appendix C provides a flexible approach to guide the excavation process and minimize potential for costly over-excavation, or rework due to under-excavation.

## 5.2 Disposal of Soil Storage Cell Soils at a RCRA Subtitle D Landfill

Disposal of minimally contaminated soils from Soil Storage Cells 1, 2, and 3 in a nearby RCRA Subtitle D facility presents an opportunity for significant cost savings over disposal at a more remote RCRA Subtitle C facility. In order to allow disposal of Cell soils at a RCRA subtitle D facility, EPA is seeking a "contained-in" determination to demonstrate that the soils no longer contain RCRA-listed hazardous waste.

## 5.3 Soil Screening and Material Reuse

Cost reductions may be realized through segregation of contaminated fine-grained materials from coarse-grained materials (gravel) and reuse of these materials as onsite backfill. The purpose of this design optimization is to reduce the overall volume of soils trucked offsite for disposal and minimize the volume of import fill needed to meet final grades.

Soil screening will be conducted to separate coarse-grained materials and fine-grained materials. This operation may require stockpiling contaminated soils prior to the screening operation, as well as stockpiling segregated materials after screening. Cost savings will be determined based on the vendor cost of the soil screening operation per ton compared to transport and disposal cost savings for reclaimed materials.

The existing TPS-1 asphalt cap and sub-base material will be removed and stockpiled to expose underlying contaminated soils for excavation. This material will also be reused to minimize the volume of offsite borrow materials, providing further cost savings.

# 6.0 Remedial Action Contracting Strategy

SECTION 6

# 6 Remedial Action Contracting Strategy

EPA will procure the RA contractor with limited assistance from CH2M HILL. It is assumed that EPA will use standard bidding instructions, bid evaluation criteria, and contract terms and condition forms to complete the RA contract bid document. CH2M HILL staff will support EPA in a pre-bid meeting with prospective bidders, help resolve bidder issues and inquiries, and issue design-related addendums. CH2M HILL will provide technical support to EPA during the bid evaluation process, as requested. Assistance may involve reviewing bids for technical responsiveness, and assisting with final contractor selection and negotiations leading to contract award.

Based on the potential variability of excavation, backfill, screening, transport, and disposal quantities, these items will be contracted on a unit price basis, with the remainder of the construction scope being contracted as a firm fixed price (lump sum) contract.

Based on the results of a value engineering (VE) screening (CH2M HILL, September 7, 2006), the potential for saving costs on this project revolve around the unknown quantities of materials to be excavated and disposed of. The best way to reduce the cost of remediation is to have as much accurate onsite analysis of the soil as feasible, and adequate construction inspection to make timely decisions to direct the contractor. In addition, the special conditions of the contract should have a significant (for example, 40 percent) quantity variation clause to allow for addition and deletion of work without causing a change in the unit price rate for the work item.

# 7.0 Permit Considerations

SECTION 7

# 7 Permit Considerations

Activities undertaken on a CERCLA site by authority of CERCLA, as approved or required by EPA, are not required to obtain permits. However, the "substantive requirements" of such permits must still be met.

The Oregon Natural Heritage Program identified several rare, threatened or endangered plant species that have been recorded within a 2-mile radius of TLT, and may be present in the vegetated areas between the facility and the South Yamhill River. Prior to any excavation or significant disturbance in this area, the absence of protected plant species will be confirmed.

There are no known cultural resources within the project site; however, Grand Ronde Tribes have traditionally used the South Yamhill River for fishing, and cultural sites may be present along the river bank in this area. Prior to excavating in the river bank, the possibility of cultural sites within the area will be investigated.

The Contractor will prepare an Erosion and Stormwater Control Plan that provides reasonable assurances and measures for containing contaminated soil and dust, fuel, materials and debris, for protecting surface water and for avoiding take under the Endangered Species Act. The plan will address stormwater runoff and erosion control, and will be reviewed and approved by the oversight engineer during the RA. In addition, the Contractor will prepare a HSP that should include adequate provisions for dust control and air monitoring.

*Onchorhynchus mykiss* (steelhead), a threatened anadromous species, may be present in the South Yamhill River. To minimize potential impacts to steelhead, in-water (or "near-water") work should be scheduled for mid- to late summer when the river is lowest. Adequate measures must be taken to ensure that contaminated soil from the gullies does not enter either the South Yamhill River or Rock Creek.

Permit considerations applicable to remedial action activities, and the entities that have jurisdiction over these permits, are given in Table 7-1.

TABLE 7-1
Permits to Consider
*Taylor Lumber and Treating Superfund Site*

| RA Activity | Regulation | Jurisdiction |
| --- | --- | --- |
| **Onsite Remediation** | | |
| Direct discharge of wastewater or decontamination water to onsite stormwater treatment system. | NPDES | ODEQ |
| Pretreat wastewater or decontamination water prior to discharge to the City of Sheridan POTW. | CWA | ODEQ |
| Submit Notice of Intent for general construction SWPPP | NPDES | ODEQ |
| Construction air quality monitoring and emissions evaluation | CAA and NAAQS | ODEQ |
| Solid waste permit for offsite waste disposal | RCRA | ODEQ |
| Transport of hazardous waste to Subtitle C landfill | | ODOT |
| Excavation of soil from RR ditches (Right-of-Entry) | | Willamette Pacific Railroad |
| **Road Ditch and Gulley Remediation** | | |
| Excavation of ditch soil next to county and state highways | | Yamhill County, ODOT |
| Set up equipment and storm water and debris catch basins in wetland or below ordinary high water mark of South Yamhill River | CWA | USACE |
| Set up equipment and storm water and debris catch basins in 100-year floodplain along South Yamhill River | Floodplain Management | Federal Emergency Management Agency |
| Any activity that may impact threatened or endangered species and their habitat | Endangered Species Act | USF&W |
| Bank stabilization and/or installation of culvert outfall erosion protection | CWA | USACE |

# 8.0 Land Access and Easement Requirements

**SECTION 8**

# 8 Land Access and Easement Requirements

Access agreements will be required for RA construction work to provide access for vegetation removal, excavation, backfill placement and periodic inspections and groundwater monitoring. On the industrial portion of the site, PWPO has entered a cooperative agreement for Superfund activities at the site as part of the Prospective Purchasers agreement with EPA. Any access to the PWPO-owned portion of the site must be coordinated with the site manager, Bob Halderman/PWPO, at 503/843-2122.

Along the northern boundary of the site, the right-of-way for the Willamette Pacific Railroad (WPRR) extends 25 feet from the centerline of the tracks. Any work performed in the WPRR right-of-way will require the preparation of an environmental contractor’s Right-of-Entry. Coordination of the Right-of-Entry can be initiated through Dennis Hanna/WPRR at 503/508-7440.

For work conducted in the ditches located south of the West Valley Highway, an access agreement will be required with the property owner, (b) (6) /”Dee” Industrial, at 503/434-5525.

The Final Design Drawings identify work to be performed in these areas and will be used as attachments to develop these agreements, if necessary, to show the landowners where work will be performed.

At this time, no permanent easements are anticipated.

# 9.0 Final Design

**SECTION 9**

# 9 Final Design

The Final Design includes the drawings and specifications and the balance of information constituting this Final Design and Design Basis Report submittal as described in the *Remedial Design Work Plan* (CH2M HILL, 2006a). Additional components include a revised RA schedule (Figure 9-1), Soil Sampling and Analysis Plan (SSAP; Appendix C), and Construction Quality Assurance Plan (CQAP; Appendix E). The RA cost estimate and an Inspection and Maintenance Plan for the Asphalt Cap have also been developed (submitted under separate cover). The final design drawings and detailed specifications are also submitted under separate cover to facilitate preparation of bid documents.

## 9.1 RA Construction Schedule and Cost Estimate

The RA construction schedule presents an updated estimated timeline (in Microsoft Project format) for RA activities, beginning with subcontract award and extending through construction completion. This RA construction schedule is provided in Figure 9-1 and was prepared using information from the Final Design drawings and understanding of work presented in this document. The RA cost estimate was developed in accordance with guidance provided in USACE Regulation 1110-1301, *Cost Engineering Policy and General Requirements for Hazardous, Toxic, and Radioactive Waste Remedial Action Cost Estimates*. Although the USACE guidance specifies use of the MCASES – Gold software for cost estimating, the RA cost estimate was developed in Heavy Bid™, 2006 Revision software developed by Heavy Construction Systems Specialists. The estimate reflects current prices for labor, materials, and equipment and will separately identify contingencies within the defined project scope. Where possible, the cost estimate is based on direct or unit price quotations from local vendors and contractors. The RA cost estimate has an accuracy of -5 to +15 percent.

| ID | Task Name | Duration | Predecessors | Start | Finish |
|---|---|---|---|---|---|
| 1 | **Remedial Action Construction** | **31 wks** | | **Mon 3/5/07** | **Thu 10/4/07** |
| 2 | **Preconstruction Activities** | **8 wks** | | **Mon 3/5/07** | **Fri 4/27/07** |
| 3 | Bid Award - Notice to Proceed | 0 wks | | Mon 3/5/07 | Mon 3/5/07 |
| 4 | Construction Submittals | 4 wks | 3 | Mon 3/5/07 | Fri 3/30/07 |
| 5 | Submittal Review and Approval | 4 wks | 4 | Mon 4/2/07 | Fri 4/27/07 |
| 6 | **Mobilization and Site Preparation** | **1 wk** | **2** | **Mon 4/30/07** | **Fri 5/4/07** |
| 7 | Install Site Trailers | 1 wk | | Mon 4/30/07 | Fri 5/4/07 |
| 8 | Mobilize Equipment | 1 wk | | Mon 4/30/07 | Fri 5/4/07 |
| 9 | Preconstruction Survey | 1 wk | | Mon 4/30/07 | Fri 5/4/07 |
| 10 | **Site Preparation and Erosion Control** | **13 wks** | **6** | **Mon 5/7/07** | **Mon 8/6/07** |
| 11 | Install Silt Fence and Sediment Barriers | 1 wk | | Mon 5/7/07 | Fri 5/11/07 |
| 12 | Remove Lumber/Equip From Work Areas (By Owner) | 12 wks | | Mon 5/7/07 | Fri 7/27/07 |
| 13 | Clear Vegetation from Ditches and Gullies | 1 wk | 21SF-1 wk | Mon 7/30/07 | Mon 8/6/07 |
| 14 | **Soil Excavation and Disposal** | **16 wks** | | **Mon 5/14/07** | **Fri 8/31/07** |
| 15 | Excavate Cell 3 Soil, Haul to Screening Operation | 2 wks | 11 | Mon 5/14/07 | Fri 5/25/07 |
| 16 | Excavate/Mix/Dry Cell 2 Soil, Haul to Subtitle D Landfill | 8 wks | 11 | Mon 5/14/07 | Fri 7/6/07 |
| 17 | Excavate Cell 1 Soil, Haul to Subtitle D Landfill | 3 wks | 15 | Mon 5/28/07 | Fri 6/15/07 |
| 18 | Excavate TPS-1 Soil, Haul to Subtitle C Landfill | 7 wks | 11 | Mon 5/14/07 | Fri 6/29/07 |
| 19 | Excavate TPS-2 Soil, Haul to Screening Operation | 4 wks | 18 | Mon 7/2/07 | Fri 7/27/07 |
| 20 | Excavate WPS Soil, Haul to Screening Operation | 2 wks | 19 | Mon 7/30/07 | Fri 8/10/07 |
| 21 | Excavate Ditches and Gullies, Haul to Landfill | 3 wks | 20 | Mon 8/13/07 | Fri 8/31/07 |
| 22 | Haul Screened Fine-Grained Soils to Subtitle C Landfill | 15 wks | 18SS+1 wk | Mon 5/21/07 | Fri 8/31/07 |
| 23 | Haul Screened Fine-Grained Soils to Subtitle D Landfill | 13 wks | 15SS+1 wk | Mon 5/21/07 | Fri 8/17/07 |
| 24 | **XRF and Confirmation Sampling** | 16 wks | 21FF,18SS | Mon 5/14/07 | Fri 8/31/07 |
| 25 | **Screening** | **18 wks** | | **Mon 5/14/07** | **Fri 9/14/07** |
| 26 | Mobilization and Setup | 1 wk | 11 | Mon 5/14/07 | Fri 5/18/07 |
| 27 | Screening | 16 wks | 26 | Mon 5/21/07 | Fri 9/7/07 |
| 28 | Demobilization | 1 wk | 27 | Mon 9/10/07 | Fri 9/14/07 |
| 29 | **Backfill and Grading** | **10 wks** | | **Mon 7/2/07** | **Fri 9/7/07** |
| 30 | Soil Cells - Place/Grade/Compact Backfill | 1 wk | 15,16,17 | Mon 7/9/07 | Fri 7/13/07 |
| 31 | Onsite Soil Cont. Areas - Place/Grade/Compact Backfill | 8 wks | 20FF+2 wks,1ł | Mon 7/2/07 | Fri 8/24/07 |
| 32 | Ditch/Gully Cont. Areas - Place/Grade/Compact Backfill | 2 wks | 21FF+1 wk | Mon 8/27/07 | Fri 9/7/07 |
| 33 | **Paving** | **7 wks** | | **Mon 6/18/07** | **Fri 8/3/07** |
| 34 | Pavement Reconstruction | 4 wks | 18FF+2 wks | Mon 6/18/07 | Fri 7/13/07 |
| 35 | Pavement Patch/Repair | 2 wks | 34SS | Mon 6/18/07 | Fri 6/29/07 |
| 36 | Drainage Modifications | 2 wks | 34SS | Mon 6/18/07 | Fri 6/29/07 |
| 37 | Low Permeability Pavement Overlay | 3 wks | 34,35,36 | Mon 7/16/07 | Fri 8/3/07 |
| 38 | **Site Restoration** | **7 wks** | | **Mon 7/30/07** | **Fri 9/14/07** |
| 39 | Fence Installation | 1 wk | 19 | Mon 7/30/07 | Fri 8/3/07 |
| 40 | Cleanup and Repairs | 1 wk | 32 | Mon 9/10/07 | Fri 9/14/07 |
| 41 | Post Construction Survey | 1 wk | 32 | Mon 9/10/07 | Fri 9/14/07 |
| 42 | **Final-Acceptance** | **2 wks** | | **Fri 9/7/07** | **Fri 9/21/07** |
| 43 | Prefinal Inspection (EPA and DEQ) | 0 days | 32 | Fri 9/7/07 | Fri 9/7/07 |
| 44 | Punch List Correction | 2 wks | 43 | Mon 9/10/07 | Fri 9/21/07 |
| 45 | Final Inspection | 0 wks | 44 | Fri 9/21/07 | Fri 9/21/07 |
| 46 | **Substantial Completion Milestone** | 0 wks | | Sun 9/30/07 | Sun 9/30/07 |
| 47 | **Demobilization** | 2 wks | 44 | Mon 9/24/07 | Thu 10/4/07 |

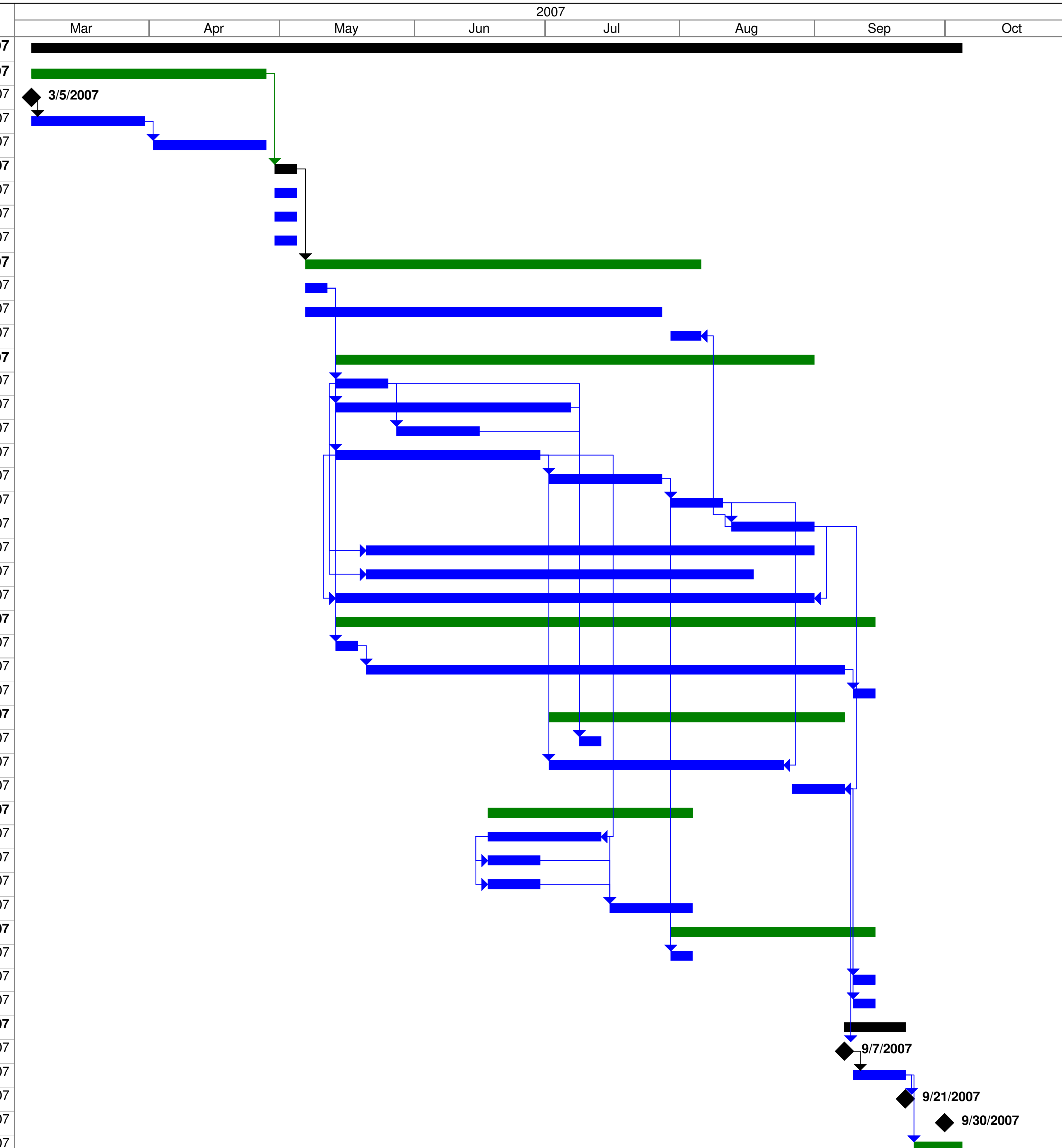


FIGURE 9-1
Preliminary Remedial Action Construction Schedule
*Taylor Lumber and Treating Superfund Site, Sheridan, Oregon*

CH2MHILL

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Task | | Milestone | ◆ | Rolled Up Task | | Rolled Up Progress | | External Tasks | |
| Progress | | Summary | | Rolled Up Milestone | ◇ | Split | | Project Summary | |

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# 10.0 References

**SECTION 10**

# 10 References


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## Appendix A

# Soil Sample Location Map and Data

TABLE A-1

Arsenic - Soil-Onsite (West) Concentrations in mg/kg

*Taylor Lumber and Treating Superfund Site*

| Samples that Exceed Industrial Risk Based Concentrations (RBCs) for Industrial Soil[1] $10^{-5}$ 15.9 | $10^{-4}$ 159 | Sample ID | Date of Collection[2] | Type[3] | Sample depth in feet below ground surface | Arsenic Concentration | Q[4] | Comments |
|---|---|---|---|---|---|---|---|---|
| X | | AP-01 | 1999 | N | 0-2 | 37.5 | = | "ash pile" samples, collected before the construction of soil storage cells |
| | | AP-02 | 1999 | N | 8-10 | 6 | = | |
| X | | AP-03 | 1999 | N | 0-2 | 66.6 | = | |
| | | AP-04 | 1999 | N | 8-10 | 10 | = | |
| X | | BG-01 | 1999 | N | 10-12 | 71.8 | J | background sample |
| X | | CD-01-SD | 1999 | N | -- | 36.6 | = | "center ditch", SD refers to sediment sample |
| | | CD-02-SD | 1999 | N | -- | 1.4 | J | |
| X | | DS-21 | 2003 | FD | 0-1 | 52.8 | = | Collected from surface deposition |
| X | | DS-22 | 2003 | N | 0-1 | 29.1 | = | |
| X | | DS-23 | 2003 | N | 0-1 | 35.5 | = | |
| | | GP-01-SS | 2002 | N | 5-10 | 6.1 | = | geoprobe samples |
| | | GP-02-SS | 2002 | N | 0-5 | 13.4 | = | |
| X | | GP-08-SS | 2002 | N | 0-5 | 16.9 | = | |
| X | | MD-01-SD | 1999 | N | -- | 115 | = | "middle ditch", sediment |
| X | | MD-04-SD | 1999 | N | -- | 79.8 | = | |
| | | MD-05-SD | 1999 | N | -- | 15.8 | J | |
| | | MW-017S | 1999 | N | 4-5.5 | 7.4 | = | sample collected during well installation. |
| | | ND-01-SD | 1999 | N | -- | 9 | = | "north ditch" sediment |
| | | ND-02-SD | 1999 | N | -- | 7.1 | = | |
| X | | ND-03-SD | 1999 | N | -- | 18.2 | = | |
| X | | NRD-01-SD | 1999 | N | -- | 35.8 | = | "north RR ditch" sediment |
| X | | NRD-02-SD | 1999 | N | -- | 36.2 | = | |
| X | | NRD-03-SD | 1999 | N | -- | 19 | = | |
| X | | NRD-04-SD | 1999 | N | -- | 28.5 | = | |

TABLE A-1

Arsenic - Soil-Onsite (West) Concentrations in mg/kg

*Taylor Lumber and Treating Superfund Site*

| Samples that Exceed Industrial Risk Based Concentrations (RBCs) for Industrial Soil[1] $10^{-5}$ 15.9 | $10^{-4}$ 159 | Sample ID | Date of Collection[2] | Type[3] | Sample depth in feet below ground surface | Arsenic Concentration | Q[4] | Comments |
|---|---|---|---|---|---|---|---|---|
| | | OS-01 | 1999 | N | 0-1 | 7.2 | = | "onsite soil" shallow test pits |
| X | X | OS-02 | 1999 | N | 0-1 | 778 | = | |
| | | OS-03 | 1999 | N | 0-1 | 9.7 | J | |
| | | OS-04 | 1999 | N | 0-1 | 7.4 | J | |
| | | OS-05 | 1999 | N | 0-1 | 13.9 | J | |
| | | OS-06 | 1999 | N | 0-1 | 10.7 | = | |
| | | OS-07 | 1999 | N | 0-1 | 6.3 | = | |
| | | OS-08 | 1999 | N | 0-1 | 9.1 | J | |
| X | | OS-09 | 1999 | N | 0-1 | 35.5 | J | |
| X | X | OS-10 | 1999 | N | 0-1 | 202 | = | |
| | | OS-11 | 1999 | N | 0-1 | 8.1 | J | |
| X | X | OS-12 | 1999 | N | 0-1 | 633 | = | |
| X | X | OS-13 | 1999 | N | 0-1 | 187 | = | |
| X | X | OS-14 | 1999 | N | 0-1 | 251 | = | |
| X | | PS-01 | 1999 | N | 0-2 | 34.5 | = | "pole storage" boreholes |
| | | PS-02 | 1999 | N | 6-8 | 4.7 | = | |
| X | | PS-03 | 1999 | N | 0-2 | 34.3 | = | |
| | | PS-04 | 1999 | N | 6-8 | 7.5 | = | |
| | | PS-05 | 1999 | N | 6-8 | 5.9 | = | |
| | | PS-06 | 1999 | N | 6-8 | 5.8 | = | |
| | | PS-07 | 1999 | N | 4-6 | 6.7 | = | |
| | | PS-08 | 1999 | N | 0-2 | 10.3 | = | |
| | | PS-09 | 1999 | N | 6-8 | 7 | J | |
| | | PS-10 | 1999 | N | 6-8 | 4 | J | |
| | | PS-11 | 1999 | N | 0-2 | 7.2 | = | |
| | | PS-12 | 1999 | N | 0-2 | 8.2 | = | |
| X | | PS-13 | 1999 | N | 0-2 | 31.8 | J | |
| X | X | PS-14 | 1999 | N | 0-2 | 293 | J | |

TABLE A-1

Arsenic - Soil-Onsite (West) Concentrations in mg/kg

*Taylor Lumber and Treating Superfund Site*

| Samples that Exceed Industrial Risk Based Concentrations (RBCs) for Industrial Soil[1] $10^{-5}$ 15.9 | $10^{-4}$ 159 | Sample ID | Date of Collection[2] | Type[3] | Sample depth in feet below ground surface | Arsenic Concentration | Q[4] | Comments |
|---|---|---|---|---|---|---|---|---|
| X | | SRD-01-SD | 1999 | N | -- | 58.4 | = | "south RR ditch" sediment |
| X | | SRD-04-SD | 1999 | N | -- | 23 | = | |
| X | | SRD-05-SD | 1999 | N | -- | 58.5 | = | |
| X | | SRD-06-SD | 1999 | N | -- | 69.8 | = | |
| X | | SRD-07-SD | 1999 | N | -- | 17.5 | = | |
| | | SS-1 | 2006 | N | 0-0.5 | 12.6 | = | surface soils, data supersedes OS-9, -10, and -11 |
| | | SS-2 | 2006 | N | 0-0.5 | 2.2 | U | |
| | | SS-3 | 2006 | N | 0-0.5 | 2.3 | U | |
| | | SS-4 | 2006 | N | 0-0.5 | 2.3 | U | |
| | | SS-5 | 2006 | N | 0-0.5 | 2.2 | U | |
| | | TB-101 | 2000 | N | 13-15.5 | 1.7 | = | Boreholes in the treatment plant area |
| | | TB-102 | 2000 | N | 10-11.5 | 2.1 | J | |
| | | TB-103 | 2000 | N | 11.5-14.5 | 1.5 | J | |
| | | TB-104 | 2000 | N | 11.5-14.5 | 1.9 | J | |
| | | TB-105 | 2000 | N | 19-19.5 | 13 | J | |
| | | TB-106 | 2000 | N | 7-8.5 | 10 | = | |
| | | TB-107 | 2000 | N | 11.5-12.5 | 2.1 | J | |
| | | TB-108 | 2000 | N | 12.5-15.5 | 0.55 | = | |
| | | TB-109 | 2000 | N | 10-13 | 8.7 | = | |
| | | TB-110 | 2000 | N | 16-17 | 6.6 | = | |
| | | TB-111 | 2000 | N | 14-15 | 1 | = | |
| | | TB-112 | 2000 | N | 14.5-16 | 1.4 | = | |
| | | TB-113 | 2000 | N | 10-13.5 | 2.1 | = | |
| | | TB-114 | 2000 | N | 13-15.5 | 1 | = | |
| | | TB-115 | 2000 | N | 17.5-22.5 | 8.8 | = | |
| | | TB-116 | 2000 | N | 16-17 | 5 | = | |
| | | TB-117 | 2000 | N | 16-16.5 | 10 | = | |
| | | TB-120 | 2000 | N | 16-17 | 5.5 | = | |
| | | TB-121 | 2000 | N | 16-16.5 | 5.4 | = | |
| | | TB-122 | 2000 | N | 13-14 | 0.92 | = | |

TABLE A-1

Arsenic - Soil-Onsite (West) Concentrations in mg/kg

*Taylor Lumber and Treating Superfund Site*

| Samples that Exceed Industrial Risk Based Concentrations (RBCs) for Industrial Soil[1] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $10^{-5}$ 15.9 | $10^{-4}$ 159 | Sample ID | Date of Collection[2] | Type[3] | Sample depth in feet below ground surface | Arsenic Concentration | Q[4] | Comments |
| | | TP-01 | 1999 | N | 6-8 | 8.1 | = | Boreholes in the treatment plant area |
| | | TP-02 | 1999 | N | 6-8 | 5.6 | = | |
| | | TP-03 | 1999 | N | 0-2 | 9.7 | = | |
| | | TP-04 | 1999 | N | 6-8 | 9.4 | J | |
| | | TP-05 | 1999 | N | 0-2 | 7.6 | = | |
| | | TP-06 | 1999 | N | 8-10 | 2.1 | J | |
| X | | TP-07 | 1999 | N | 0-2 | 120 | = | |
| | | TP-08 | 1999 | N | 22-24 | 8.2 | J | |
| | | TP-09 | 1999 | N | 0-2 | 5.9 | = | |
| | | TP-10 | 1999 | N | 6-8 | 6.5 | J | |
| X | | TP-11 | 1999 | N | 0-2 | 39.5 | = | |
| X | X | TP-12 | 1999 | N | 0-2 | 595 | J | |
| | | TP-13 | 1999 | N | 6-8 | 8.3 | J | |
| X | | TP-14 | 1999 | N | 4-6 | 22.4 | J | |
| X | | TP-15 | 1999 | N | 0-2 | 23.1 | = | |
| | | TP-16 | 1999 | N | 8-10 | 3.8 | J | |
| X | | TP-17 | 1999 | N | 0-2 | 30.7 | = | |
| | | TP-18 | 1999 | N | 16-18 | 4.1 | J | |
| | | TP-19 | 1999 | N | 16-18 | 8.8 | J | |
| | | TP-20 | 1999 | N | 4-6 | 6.3 | J | |
| | | TP-21 | 1999 | N | 0-2 | 7.5 | = | |
| | | TP-22 | 1999 | N | 6-8 | 4.5 | J | |
| | | TP-23 | 1999 | N | 12-14 | 1.1 | J | |
| | | TP-24 | 1999 | N | 6-8 | 4.2 | J | |
| | | TP-25 | 1999 | N | 12-14 | 3.3 | J | |

TABLE A-1

Arsenic - Soil-Onsite (West) Concentrations in mg/kg

*Taylor Lumber and Treating Superfund Site*

| Samples that Exceed Industrial Risk Based Concentrations (RBCs) for Industrial Soil[1] $10^{-5}$ 15.9 | $10^{-4}$ 159 | Sample ID | Date of Collection[2] | Type[3] | Sample depth in feet below ground surface | Arsenic Concentration | Q[4] | Comments |
|---|---|---|---|---|---|---|---|---|
| X | | WD-01-SD | 1999 | N | -- | 29.2 | = | "west ditch" sediment |
| X | | WD-02-SD | 1999 | N | -- | 26.8 | = | |
| | | WF-01 | 2002 | N | 0-2 | 15.4 | J | "west facility" shallow borings. at WF-05, WF-11 and WF-12, a 0 to 6 inch sample was collected for comparison to the 0-2 feet sample |
| X | | WF-02 | 2002 | N | 0-2 | 33.1 | J | |
| | | WF-03 | 2002 | N | 0-2 | 11.1 | J | |
| X | | WF-04 | 2002 | N | 0-2 | 113 | J | |
| X | | WF-05U | 2002 | N | 0-0.5 | 53.3 | = | |
| | | WF-05L | 2002 | N | 0-2 | 11 | = | |
| X | | WF-06 | 2002 | N | 0-2 | 18.2 | J | |
| X | X | WF-07 | 2002 | N | 0-2 | 241 | J | |
| X | | WF-08 | 2002 | FD | 0-2 | 17.9 | J | |
| X | | WF-09 | 2002 | N | 0-2 | 68.4 | = | |
| X | | WF-10 | 2002 | N | 0-2 | 22.8 | = | |
| X | | WF-11U | 2002 | N | 0-0.5 | 27.6 | = | |
| X | | WF-11L | 2002 | N | 0-2 | 19 | = | |
| X | X | WF-12U | 2002 | N | 0-0.5 | 168 | = | |
| X | | WF-12L | 2002 | N | 0-2 | 98 | | |
| X | | WF-13 | 2002 | N | 0-2 | 17 | = | |
| | | WF-14 | 2002 | N | 0-2 | 10 | = | |
| | | WF-15 | 2002 | N | 0-2 | 9.7 | = | |

TABLE A-1

Arsenic - Soil-Onsite (West) Concentrations in mg/kg

*Taylor Lumber and Treating Superfund Site*

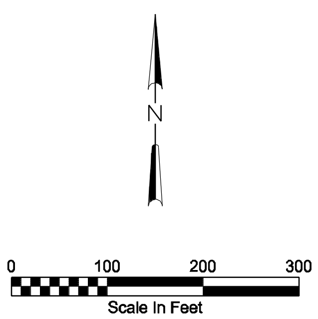
| Samples that Exceed Industrial Risk Based Concentrations (RBCs) for Industrial Soil[1] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $10^{-5}$ | $10^{-4}$ | | | | | | | |
| 15.9 | 159 | Sample ID | Date of Collection[2] | Type[3] | Sample depth in feet below ground surface | Arsenic Concentration | Q[4] | Comments |
| | | WP-01 | 1999 | N | 4-6 | 5.7 | = | |
| | | WP-02 | 1999 | N | 6-8 | 6 | J | |
| | | WP-03 | 1999 | N | 2-4 | 7.4 | = | |
| | | WP-04 | 1999 | N | 6-8 | 6 | J | |
| | | WP-05 | 1999 | N | 4-6 | 5.9 | = | |
| | | WP-06 | 1999 | N | 6-8 | 6 | J | |
| | | WP-07 | 1999 | N | 0-2 | 7.4 | = | white pole boreholes |
| | | WP-08 | 1999 | N | 6-8 | 6 | J | |
| | | WP-09 | 1999 | N | 4-6 | 6.6 | = | |
| | | WP-10 | 1999 | N | 6-8 | 2 | J | |
| | | WP-11 | 1999 | N | 0-2 | 8.7 | = | |
| | | WP-12 | 1999 | N | 6-8 | 4 | J | |
| | | WP-13 | 1999 | N | 4-6 | 6.3 | = | |

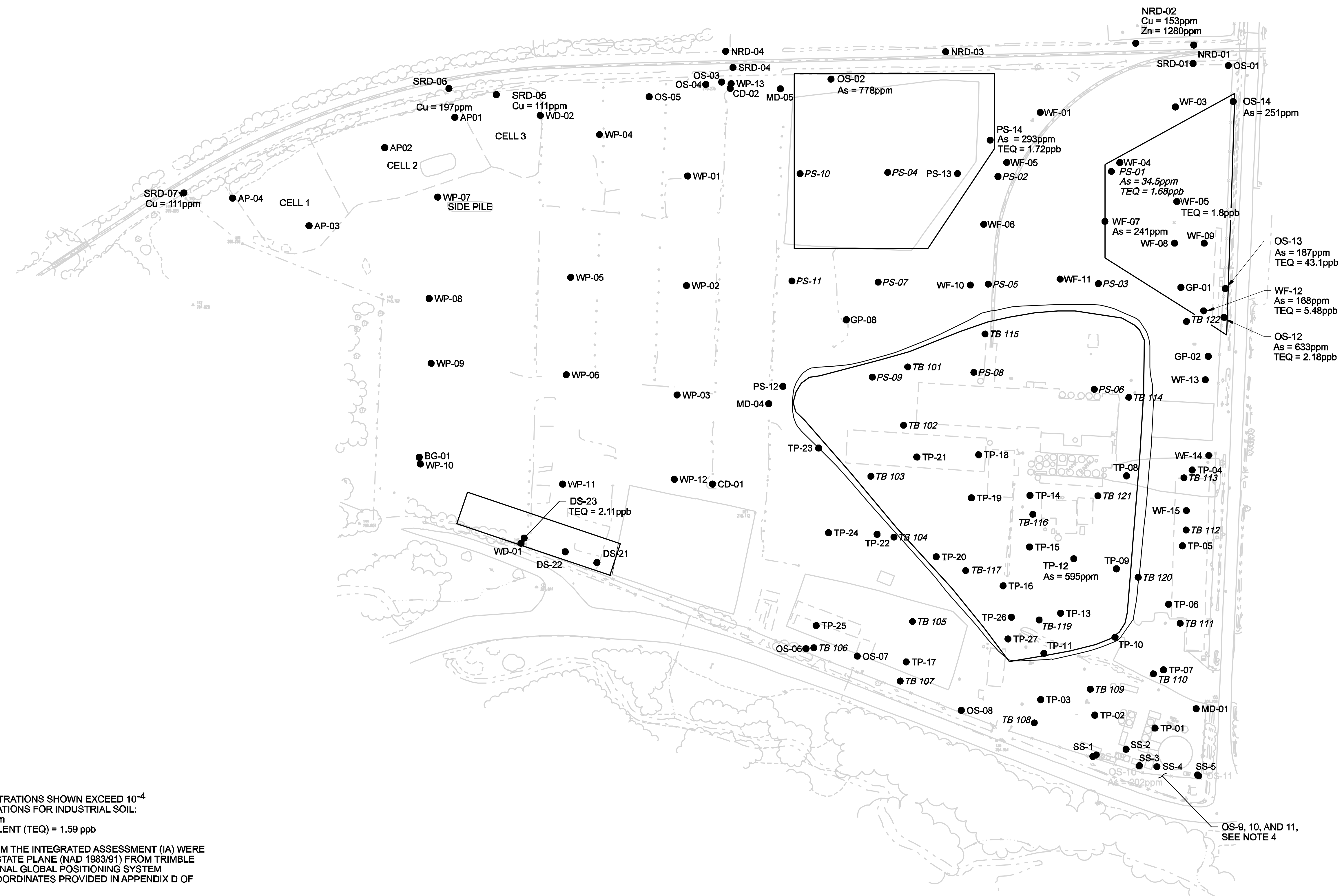
Notes: [1]Samples that exceed RBCs are shown in red on Figure A-1.

[2] Data was collected during the 1999 Integrated Assessment, the 2000 Removal Action, 2002 Phase II Investigation, 2003 and 2006 Soil Investigation.
Arsenic screening data from onsite field analysis by X-ray fluorescence are not included, however the 2 acres in the NW corner of the TPS were paved based on this data.

[3] N= normal sample, FD = field duplicate (FD only presented if concentration is higher than N).

[4] Qualifiers: "=" analyte was positively identified; "J" analyte was positively identified, the associated numerical result is an estimate, U = soil was analyzed but not detected.




NOTES:

1. SAMPLES WITH CONCENTRATIONS SHOWN EXCEED $10^{-4}$ RISK-BASED CONCENTRATIONS FOR INDUSTRIAL SOIL:
   ARSENIC ($A_S$) = 159 ppm
   DIOXIN TOXIC EQUIVALENT (TEQ) = 1.59 ppb
2. SAMPLE LOCATIONS FROM THE INTEGRATED ASSESSMENT (IA) WERE IMPORTED TO OREGON STATE PLANE (NAD 1983/91) FROM TRIMBLE PATHFINDER PROFESSIONAL GLOBAL POSITIONING SYSTEM LATITUDE/LONGITUDE COORDINATES PROVIDED IN APPENDIX D OF THE IA.
3. SAMPLE LOCATIONS IN ITALICS DID NOT HAVE GPS OR OTHER LOCATION INFORMATION AVAILABLE - LOCATIONS ARE APPROXIMATE.
4. SS-1 THROUGH SS-5 (SOUTH OF THE STORMWATER TREATMENT SYSTEM) WERE COLLECTED DURING JULY 2006 AND REPLACE 0S-9 THROUGH OS-11.

# FIGURE A-1
# SOIL REMEDIATION AREA DELINEATION
TAYLOR LUMBER AND TREATING SUPERFUND SITE

FigA-1_342790.dgn 11/29/2006

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# APPENDIX B
# ARARs

**APPENDIX B**

# ARARs for the Remedial Action

Excerpted and updated from the Record of Decision (September 30, 2005) Section 13.2, the federal and state action-, chemical-, and location-specific applicable, relevant and appropriate requirements (ARARs) for the Remedial Action are summarized below:

- Oregon Environmental Cleanup Rules – Oregon Environmental Cleanup Rules (OAR 340-122) are applicable for the establishment of cleanup levels and selection of remedial actions for soil at the site. OAR 340-122-0040(2) requires that hazardous substance remedial actions achieve one of four standards: 1) acceptable risk levels, 2) generic soil numeric cleanup levels, 3) remedy-specific cleanup levels provided by Oregon DEQ as part of an approved generic remedy, or 4) background levels in areas where hazardous substances occur naturally. The selected remedy will meet this ARAR by achieving acceptable risk levels (that is, standard 1) through excavation and offsite disposal to an acceptable disposal facility) and institutional controls. The Oregon Hazardous Substance Remedial Action Rules require consideration of treatment of hot spots to the extent feasible (OAR 340-122-0040). Hot spots were identified at the TLT site, and treatment was considered to the extent feasible. Hot spots will be addressed through excavation and offsite disposal to an acceptable disposal facility, and institutional controls.
- Oregon Hazardous Waste Regulations and federal RCRA (40 CFR Parts 260 to 268; OAR 340-100 to 340-106) – Federal regulations promulgated under RCRA, and corresponding state law, provide standards for the management and disposal of solid and hazardous waste. These regulations are applicable to the remedial action because it generates waste and treatment residuals. Waste sent off-property will comply with the Oregon RCRA rules pertaining to the generation, transportation, treatment, storage, and disposal of hazardous waste.

  Transportation of hazardous materials is regulated by 49 CFR Parts 171 to 177. Requirements for transportation of hazardous materials include classification, proper packaging, proper labeling and placarding, inspection, proper loading and unloading techniques, and required training. These requirements apply to contaminated soils or other remediation wastes that are considered hazardous wastes and shipped offsite.

  The State of Oregon has adopted the RCRA Land Disposal Restrictions (LDRs) (40 CFR Part 268), which are applicable requirements for off-property treatment and disposal of soils classified as a hazardous waste. Because the West Facility meets the requirements to be an Area of Contamination (AOC), LDRs are not applicable if wastes are consolidated within the AOC, capped in place, or processed within the AOC (but not in a separate unit, such as a tank) to improve its structural stability.

  The RCRA regulations establish performance standards that are relevant and appropriate for the construction and maintenance of caps to the extent that the caps are being designed to prevent direct contact with surface soil contamination and to reduce vertical contaminant migration by minimizing stormwater infiltration. The specific

RCRA regulations are 40 CFR Section 265.111 (Closure Performance Standards), 40 CFR Section 265.117 (Post-Closure Care), and 40 CFR Section 265.310 (Landfill Closure).

- Oregon Solid Waste Management Rules (OAR 340-093 through -097) – These rules are applicable to any treatment and disposal of solid waste (for example, construction debris) that may be generated at the site during implementation of the selected remedy.
- Oregon Well Construction and Abandonment Standards (OAR 690-210 and 690-022) – These standards are applicable to the construction and abandonment of any wells at the site.
- Federal Safe Drinking Water Act (40 CFR 141) – The primary drinking water standards address toxicity and are termed MCLs. MCLs regulate the concentrations of contaminants, including PCP, in public drinking water supplies and are considered relevant and appropriate for groundwater aquifers potentially used for drinking water. Groundwater from the shallow alluvial aquifer in the vicinity of the TLT site has been, and is currently, used for domestic purposes.
- Clean Water Act (40 CFR 122) – EPA has established federal Water Quality Criteria (WQC) under the Clean Water Act. Federal WQC form the basis of Oregon water quality standards (OAR 340-041). WQC are relevant and appropriate at the TLT site for groundwater migrating off-property to adjacent surface water bodies (South Yamhill River, Rock Creek). These standards also form the basis for the NPDES permit, Permit Number 101267, expiration date 11-30-2009, which covers treatment of extracted groundwater from within the barrier wall and discharge to the South Yamhill River.
- Clean Air Act (40 CFR 50) – The Clean Air Act (CAA) regulates emissions of fugitive dust, emissions from air pollutant sources, and establishes national ambient air quality standards and national emission standards for hazardous air pollutants. The CAA is applicable to activities that might generate dust, such as excavation. In addition, the Oregon General Emission Standards for Particulate Matter (OAR 340-208-0100 through -0210) are applicable to visible emissions and nuisance conditions that may be generated by the construction of the selected remedy. Dust generated from earthwork or other disturbance of on-property soils must meet nuisance standards for fugitive emissions.
- Endangered Species Act of 1973 (16 USC 1531 et seq., 50 CFR Part 402) – The federal Endangered Species Act (ESA) requires protection for certain plant and animal species and their habitat. The ESA may be applicable to the remedial action at this site because the roadside ditches that will be remediated are connected to the South Yamhill River, which is habitat to a threatened species (winter-run steelhead) listed by the National Marine Fisheries Service.
- National and State Historic and Archaeological Preservation Act, Executive Order 11593 (16 USC 461, et seq.,) - Historic and Archaeological Preservation Act applies to any alteration that threatens significant scientific, prehistoric, historic, or archaeological data. It is possible that Native American historic sites are present along the riverbanks of the South Yamhill River, and consultation with SHPO may be needed if excavation in this area is planned.

- Floodplain Management, Executive Order No. 11988 (40 CFR Part 6 Appendix A) - This Executive Order requires that federally funded or authorized actions within the 100-year floodplain avoid, to the maximum extent possible, adverse impacts associated with the development of a floodplain. This site is located within the 100-year floodplain for the South Yamhill River. The selected remedy meets the requirements of the Executive Order.
- Protection of Wetlands, Executive Order No. 11990 (40 CFR Part 6 Appendix A) – This Executive Order requires federal agencies to minimize the destruction, loss or degradation of wetlands to the extent possible, and to preserve the value of wetlands. Wetland species are present in the seasonal ditches (less than 10 feet wide) that abut the site. The selected remedy meets the requirements of the Executive Order.
- Migratory Bird Treaty Act of 1918 (16 USC 703, et seq.,) - The Migratory Bird Treaty Act makes it unlawful to "hunt, take, capture, kill" or take various other actions adversely affecting a broad range of migratory birds, including mallards, chickadees, and robins, and is relevant and appropriate for protecting migratory bird species identified at the site. This Act is applicable to the remedy at the site. The remedy will be carried out in a manner that avoids taking or killing of protected migratory bird species.

## APPENDIX C

# Soil Sampling and Analysis Plan

# Taylor Lumber Soil Sampling and Analysis Plan

## 1 Introduction

### 1.1 Background

The Taylor Lumber and Treating Superfund Site (Taylor) has several areas with arsenic-contaminated soil that will be removed as part of the remedy for the site. This document describes a sampling and analysis plan (SAP) to:

- Evaluate arsenic concentrations in soil during this removal work, and
- Confirm that cleanup levels have been attained at the conclusion of the removal work.

It is a companion document to the Site's remedial design and builds on previous work such as the remedial investigation/feasibility study (RI/FS), the risk assessment, and the record of decision (ROD).

The ROD for the site establishes a risk-based cleanup level (CUL) of 159 mg/kg for arsenic in soil. Based on this CUL, there are several areas at Taylor where soil removal work is planned. These areas include:

- Two segments along the ditch between the railroad and the north side of the site. These segments are identified as railroad ditch east (RRD-E) and railroad ditch west (RRD-W).
- The ditch between Rock Creek Road and the east side of the site (RCRD ditch).
- The ditch between Highway 18 and the south side of the site (HWYD).
- The white pole storage area (WPS).
- Treated pole storage area 1 (TPS-1)
- Treated pole storage area 2 (TPS-2)
- Rock Creek Gully (RCG)

This SAP describes a general approach that will be used to evaluate soil remaining in each of these areas. This section presents background information about the site and provides an overview of the approach. Section 2 documents the data quality objectives (DQOs) process used to develop this SAP. Section 3 describes soil sampling conducted in advance of the soil removal work, Section 4 describes soil sampling that will be conducted during the soil removal, and Section 5 describes soil sampling used to confirm attainment of the soil CUL upon completion of soil removal.

### 1.2 Overview of Field Portable XRF

This sampling and analysis plan relies on use of field portable X-ray Fluorescence (FPXRF) instruments to inform decisionmakers about the effectiveness of soil removal work. Using FPXRF to measure arsenic in soil is an established method (FRTR, 2005). For example, EPA has had an FPXRF Method in SW-846 since 1998 (Method 6200) (EPA, 1998). This method describes use of FPXRF to quantify concentrations of up to 26 different metals, including arsenic, in soil and sediments. Method 6200 does not prescribe the type of instrument, specific calibration methods, or sample preparation techniques; rather, it generally explains principals of the analytical technique, identifies method interferences, discusses different sample preparation strategies, describes different calibration strategies, and presents method performance data.

One specific interference relevant to FPXRF measurement of arsenic in soil is the interference from lead in the sample. The method notes that lead:arsenic ratios exceeding 10:1 can limit the sensitivity of FPXRF measurements (that is, raise the detection limits). Review of existing analytical data from Taylor indicates that concentrations of arsenic and lead in soil are generally similar or that arsenic exceeds lead (CH2M HILL, 2004, Appendix A). Based on this information, the potential lead interference associated with FPXRF measurements of arsenic should be insignificant.

Method 6200 also discusses how different sample preparation techniques relate to differences in method precision. For all of the analytes, method precision increases [that is, relative standard deviations (RSDs) of replicate measurements decrease] as sample preparation steps are introduced. Arsenic RSDs for three different sample preparation techniques are as follows:

- *In situ* measurements of soil surface: 22.5 percent
- Intrusive measurements of undried and unground soil samples: 5.36 percent
- Intrusive measurements of dried and ground soil samples: 3.76 percent

These data suggest that labor-intensive sample preparation steps such as drying and grinding may only yield marginal improvements in analytical precision.

The U.S. Environmental Protection Agency (EPA) Superfund Innovative Technology Evaluation (SITE) Monitoring and Measurement Technology (MMT) Program recently evaluated the performance of several XRF instruments for quantifying metal concentrations in soil. Several of the instruments that were evaluated appear ill-suited for field analytical techniques. For example, one instrument required liquid nitrogen to cool the detector, and other instruments did not appear to be available as rental equipment. Other instruments were more portable and better-suited for field analytical techniques. Arsenic performance for three comparable hand-held instruments is summarized in Table 1.

Method detection limits and practical quantitation limits of FPXRF instruments depend, in part, on count times used per test; however, they are typically well below the 159 mg/kg action level. For example, the 2-minute run times used during the SITE evaluation of a Niton XLt 700 FPXRF resulted in a method detection limit of 18 mg/kg.

For this project, we specify a hand-held FPXRF instrument with a tube-based X-ray source, such as the Niton XLt 700. This type of instrument is better-suited for the sampling and analysis work because it doesn’t have an isotope radiation source that could diminish over time, and it doesn’t have as many licensing restrictions as an FPXRF with a radioisotope source.

TABLE 1
Summary of Field Portable X-Ray Fluorescence Performance for Measuring Arsenic in Soil
*Taylor Lumber and Treating Superfund Site*

| Instrument | Mean As MDL | As Accuracy | As Precision | Sample Throughput | Cost |
|---|---|---|---|---|---|
| InnovX XT400 | "Very Low"<br>8 mg/kg | "Moderate"<br>RPD = 23.1%<br>$R^2$ = 0.88<br>Results biased high. | RSD = 4.5% | ~86 samples per 8 hour day (two-person team). | Shipping: $200<br>Weekly Rental: $2,000 |
| Niton XLt 700 | "Very Low"<br>18 mg/kg | "Moderate"<br>RPD = 18.1%<br>$R^2$ = 0.95<br>Results biased high. | RSD = 7.9% | ~91 samples per 8 hour day (one-person team). | Shipping: $240<br>Weekly Rental: $1,500 |
| Oxford X-Met | "Very Low"<br>15 mg/kg | "Moderate"<br>RPD = 22.5%<br>$R^2$ = 0.99<br>Results biased high. | RSD = 5.8% | ~72 samples per 8 hour day (two-person team). | Shipping: $200<br>Weekly Rental: $2,000 |

Mean Method Detection Limit calculated from method detection limits from 12 different types of soil and sediment samples.

Accuracy assessed by calculating the median relative percent difference (RPD) between FPXRF results and reference method results (EPA 6010). $R^2$ is the correlation coefficient for the linear regression of FPXRF and 6010 results (results for up to 70 samples).

Precision assessed by calculating the median relative standard deviations (RSD) from replicate FPXRF results.

Samples were already ground, homogenized, and dried prior to the study, so sample throughput estimates do not reflect this sample preparation time.

## 1.3 Soil Testing Prior to Removal

Prior to soil removal work, field personnel will collect approximately 12 surface soil samples from planned excavation areas at the site. These soil samples will be used to assess the accuracy and precision of FPXRF methods by splitting soil samples and testing for arsenic using both FPXRF (*in situ* and intrusive techniques) and more definitive methods (EPA 6010). Method accuracy and precision will be assessed by linear regression of XRF results against EPA 6010 data.

FPXRF method performance information (accuracy, precision, and sample throughput) from this sampling effort will be used to better understand sources of bias and uncertainty and the required sample sizes needed during subsequent phases of the soil removal project. These samples may also be used as site-specific calibration standards as described in EPA Method 6200.

## 1.4 Soil Testing During Removal

During soil removal work, decisionmakers have an immediate need for information that allows them to decide if additional soil removal is necessary. As such, soil sampling and analysis during removal activities will consist of field sampling and analytical methods that provide near “real-time” information about arsenic in soil remaining in an excavation area. FPXRF will be used to make these measurements and provide information to decision-makers within a 24-hour cycle.

An adaptive approach is proposed such that the complexity of sampling and sample preparation techniques is commensurate with how close results are to the decision level. For example, after excavators remove a lift of soil from an area of concern, oversight personnel will identify soil sampling locations and collect multiple *in situ* FPXRF measurements from the excavation area. If spot measurements conclusively indicate that arsenic concentrations are well below or well above the CUL (taking into account the low precision of this technique), no additional testing will be conducted. If, on the other hand, concentrations are close to the decision level, field personnel will use sampling and analysis methods with higher levels of accuracy and precision (that is, intrusive FPXRF analysis of homogenized soil samples) to assess the adequacy of soil removal work. The number of samples collected from each excavation area will depend on its size and the number of samples that can be collected, processed, analyzed and reported within a 24-hour cycle.

Five percent of FPXRF soil samples collected during the removal work will be split and tested in the laboratory using EPA Method 6010. This quality control information will be used as an ongoing assessment of FPXRF method performance and to confirm that the quality of field data remains acceptable.

## 1.5 Soil Testing Upon Completion of Removal

At the conclusion of soil removal work in an area, field personnel will collect soil samples to verify that the arsenic CUL has been attained. These soil samples will be tested in the lab using EPA Method 6010. A 90 percent upper confidence limit on the mean will be used to confirm that average arsenic concentrations in soil remaining in the excavation area do not exceed the CUL.

# 2 Data Quality Objectives

DQOs have been developed to specify the quality and quantity of data needed to assess the effectiveness of soil removal work. Also, decision rules have been developed for interpreting data collected and making decisions regarding attainment of the soil CUL.

DQOs were developed using *Guidance on Systematic Planning Using the Data Quality Objectives Process* (EPA, 2006, Table 2). The seven-step process used to develop DQOs is described below.

1. **State the Problem**: Define the problem that necessitates the study.
2. **Identify the Goal of the Study**: State how environmental data will be used in meeting objectives and solving the problem, identify study questions, define alternative outcomes.
3. **Identify Information Inputs:** Identify data and information needed to answer study questions.
4. **Define the Boundaries of the Study:** Specify the target population and characteristics of interest, define spatial and temporal limits, scale of inference.
5. **Develop Analytical Approach:** Define parameter of interest, specify the type of inference, and develop the decision rules for drawing conclusions from findings.
6. **Specify Performance or Acceptance Criteria:** Specify probability limits for false rejection and false acceptance decision errors.
7. **Develop the Plan for Obtaining Data:** Select the resource-effective SAP that meets the performance criteria.

## 2.1 State the Problem

There are areas at the Taylor Lumber and Treating Superfund Site with elevated levels of arsenic in soil that will be removed during an upcoming remedial action. A plan is needed to ensure that, at completion of the remedial action, soil remaining onsite is below the CUL of 159 mg/kg for arsenic.

## 2.2 Identify the Goal of the Study

The goal of the study is to answer the question:

> Does soil remaining in excavation areas at the conclusion of the remedial action meet the CUL for arsenic?

## 2.3 Identify Inputs to the Decision

- Size of the excavation area.
- Analytical results from *in situ* FPXRF spot-measurements of soil in the excavation.
- Analytical results from FPXRF measurements of intrusive soil samples collected and tested in a field lab.

- Analytical results from EPA Method 6010 measurements of confirmation soil samples collected and tested by an environmental testing laboratory.

Note that field measurements will be used to inform decisions during the remedial action. Decisions about CUL attainment at the completion of the remedial action (after excavation is complete) will be based on laboratory analytical results.

## 2.4 Define Study Boundaries

For field decisions, the study boundary is soil at the limits of an excavation cell after equipment operators have removed a lift of soil.

The study boundary at the conclusion of the remedial action is soil at the final limits of the excavation within an area of concern.

## 2.5 Develop Decision Rule

For field decisions: Arsenic concentrations in all soil samples must be below the CUL. If a sample result exceeds 159 mg/kg, then the contractor will revisit the area and remove additional soil. A hypothesis testing approach will not be used to evaluate field screening samples.

Final decisions: The mean arsenic concentrations (conservatively estimated as the one-sided 90 percent upper confidence limit on the mean) in an area of concern must be below the CUL. If the one-sided 90 percent upper confidence limit on the mean exceeds 159 mg/kg, then additional soil may be removed.

## 2.6 Specify Tolerable Limits on Decision Errors

This section identifies the tolerable error rates based on consideration of the consequences of making an incorrect decision. Each step in determining the tolerable limits on decision errors is described below.

Verification soil samples collected from the excavation areas will be compared against the arsenic CUL in the ROD. The DQO decision for soil has two possible decision errors:

- Concluding that soil in the excavation meets the arsenic CUL when it does not. This error can lead to increased risk for any receptors that might later be exposed to arsenic from the soil.
- Concluding that soil in the excavation does not meet the arsenic CUL when it does. This error can incur unnecessary remedial costs for the site and reduce the amount of funds available for other remedial actions.

A hypotheses test has been developed that uses statistical analysis of the measurement results to select between a null and alternative hypothesis. The null hypothesis ($H_0$) describes a "default" condition that is accepted to be true in the absence of compelling evidence to the contrary. On the basis of the outcome of the statistical test, one either rejects the null hypothesis in favor of the alternative hypothesis ($H_a$), or accepts the null hypothesis.

A false rejection of $H_0$ occurs when the decisionmakers mistakenly decide that the burden of proof has been satisfied and the null hypothesis should be rejected in favor of the alternative hypothesis. A false acceptance of $H_0$ occurs when the decisionmakers mistakenly decide that the burden of proof has not been satisfied, so the null hypothesis is erroneously accepted. Tolerance for these decision errors is specified by setting acceptable error rates for either of these types of errors - $\alpha$ for false rejection rates, and $\beta$ for false acceptance rates. Table 2 describes the tolerance for decision errors.

TABLE 2
Summary of Decision Rule Tolerance Limits
*Taylor Lumber and Treating Superfund Site*

| | "True" Mean Concentration | |
|---|---|---|
| **Conclusion** | **Null Hypothesis, $H_0$: Mean Arsenic ≥ Cleanup Level** | **Alternate Hypothesis, $H_a$: Mean Arsenic < Cleanup Level** |
| Mean Arsenic ≥ Cleanup Level | Correct Conclusion | Type 2 Error<br>False Acceptance of $H_0$<br>$\beta$ = 0.20 |
| Mean Arsenic < Cleanup Level | Type 1 Error<br>False Rejection of $H_0$<br>$\alpha$ = 0.10 | Correct Conclusion |

The sample size needed to meet tolerances is estimated as described in EPA (2001, Section 5.1.1) from assumptions about the standard deviation of the sampled population and the width of the gray region between the CUL. It was calculated based on the assumptions listed in Table 3. As calculated, at least 12 samples will be needed to test the hypothesis that soil removal work has resulted in attainment of the CUL.

TABLE 3
Sample Size Estimates
*Taylor Lumber and Treating Superfund Site*

| | | | | | Parameter | | | |
|---|---|---|---|---|---|---|---|---|
| **Analyte** | **n** | ***S*** | $\Delta$ | $\alpha$ | $\beta$ | $Z_{1-\alpha}$ | $Z_{1-\beta}$ |
| Arsenic | 8 | 25 mg/kg | 20 mg/kg | 0.1 | 0.2 | 1.28155 | 0.841621 |

Notes:

The formula used to calculate the number of samples is:

$$n = \frac{S^2}{\Delta^2}\left(Z_{1-\alpha} + Z_{1-\beta}\right)^2 + 0.5Z_{1-\alpha}^2$$

Where:

*n* – number of samples,

*S* – estimated standard deviation of the measured values including analytical error,

$\Delta$ – width of the gray region (a range of mean contaminant concentrations where the consequences of making a decision error are relatively minor. The gray region is bounded on one side by the action level),

$\alpha$ – acceptable probability of incorrectly concluding the site mean is less than 159 mg/kg,

$\beta$ – acceptable probability of incorrectly concluding the site mean exceeds 159 mg/kg,

$Z_{1-\alpha}$ – value of the standard normal distribution such that the proportion of the distribution less than $Z_{1-\alpha}$ is 1-$\alpha$,

$Z_{1-\beta}$ – value of the standard normal distribution such that the proportion of the distribution less than $Z_{1-\beta}$ is 1-$\beta$.

If soil results from each of the three excavation areas indicate that results can be pooled together, at least eight samples will be collected from a combination of the areas.

## 2.7 Sample Design

Verification sampling from the soil removal areas will involve generation of at least eight 4-point composite samples from random locations within the soil removal areas. See Section 5 for additional information.

# 3 Soil Testing Prior to Removal

Before starting soil removal work at the site, several soil samples will be collected from planned excavation areas for the purposes of evaluating FPXRF method performance. This will allow team members to assess precision and accuracy information found in the FPXRF literature, validate assumptions on sampling variability, and collect data on FPXRF sample through-put in advance of the soil removal work.

One concern about using FPXRF to inform excavation decisions are reports of bias associated with the method. Previous CH2M HILL experience at other waste sites concluded that sieving out gravel fractions from soil during FPXRF sample processing steps introduced a significant positive bias in concentrations when compared to laboratory results. Trace metals such as arsenic are strongly associated with fine-grained material such as silts and clay. Removal of the coarse fraction, although increasing the uniformity of sample material and increasing precision of the measurement, also overestimated metals concentrations in soil. Failure to recognize positive bias in field analytical methods could result in excessive, costly, and unnecessary removal of soil where arsenic is below the CUL. Additionally, some of these samples can serve as site-specific calibration standards (SSCS) during subsequent field screening work as described in EPA Method 6200.

One possible means of avoiding bias in FPXRF measurements is to rely on *in situ* measurements. This technique, while avoiding any bias associated with removal of coarse materials, has the drawback of being the least precise technique for assessing arsenic. It also has its own set of bias issues. Sackett and Martin (1998) note that *in situ* measurements of soil containing coarse material on the surface can be biased low because the coarse material can “shield” the signal from fine-grained material containing metals.

## 3.1 Soil Sample Locations

Approximately 12 soil samples will be collected from within the ditches and areas where excavation is planned. Soil samples will be from areas that are dry to avoid the confounding effect of moisture content. The sampling design is focused on collecting samples that exhibit a range of arsenic concentrations, from typical background concentrations to above the soil CUL. Field personnel will survey the planned excavation areas using *in situ* measurements and select 12 sampling locations such that four soil samples will be collected within each of three concentration ranges:

**Low** – between background (~12 mg/kg) and 100 mg/kg
**Moderate** – between 100 mg/kg and 200 mg/kg
**High** – greater than 200 mg/kg.

Collecting samples with a range of concentrations will allow for the assessment of method performance at concentrations below, near, and above the 159 mg/kg CUL.

At each selected location, field personnel will collect three *in situ* spot measurements (2-minute count times) from a 4-inch by 4-inch area and collect a surface soil sample that will be split for field-intrusive FPXRF testing and laboratory analysis (see Attachment A for detailed *in situ* measurement procedures). Each location will be flagged and field personnel will provide a field description of the sampled material (color, texture, moisture content, organic matter, etc.). Soil samples will be collected by removing soil down to approximately

1 inch below ground surface, homogenizing the material in a mixing bowl, and filling one 4-ounce soil jar (for lab testing) and one 1-quart zip-lock bag (for intrusive FPXRF testing). According to Method 6200, "a 4- by 4-inch square by 1-inch deep volume of soil should produce a soil sample of approximately 375 grams or 250 $cm^3$, which is enough to fill an 8-ounce soil jar" (EPA, 1998, Section 11.4); therefore, this should be sufficient material for all tests.

## 3.2 Sample Preparation and Intrusive FPXRF Testing

In an effort to understand the effect of different sample preparation steps on FPXRF measurement error and to determine the appropriate level of sample preparation, soil samples will be tested after each sampling step as described by Sackett and Martin (1998).

1. Test soil through the quart bag and record arsenic concentrations from two, 2-minute count times.
2. Sieve soil through a #10 sieve (2 mm). Note the mass of soil passing and retained by the sieve. Homogenize the < 2.0 mm fraction, fill an FPXRF cup, and perform two, 2-minute counts on this sample.
3. Grind the whole soil until greater than 90 percent passes through a #60 sieve (250 μm), fill an FPXRF cup with ground soil, and perform two, 2-minute counts on the sample.
4. Weigh the soil sample, dry in an oven (temperature < 150°C), re-weigh the dried sample to determine the moisture content, fill an FPXRF cup with dried soil, and perform two, 2-minute counts on the sample.

See Attachment 1 for detailed measurement procedures.

## 3.3 Site-specific Calibration Standard Preparation

Depending on arsenic concentrations observed in the soil samples, up to three of the soil samples collected during this task will be used as site-specific calibration standards as described in EPA Method 6200 (EPA, 1998, Section 7.2). One or two site-specific calibration standards will be selected from the samples with arsenic concentrations that are closest to the 159 mg/kg CUL. The other site-specific calibration standard will be selected from the samples that are closest to the FPXRF's practical quantitation limit. These samples will be retained and used as standards during subsequent phases of the project.

Site-specific calibration standards will be created by submitting an aliquot of ground and homogenized soil to an environmental testing lab for analysis of total arsenic using EPA Method 6010. Testing of a ground/homogenized soil sample is expected to minimize measurement error compared to testing bulk soil, because lab tests usually only digest a 500-mg aliquot of a soil sample. Lab testing of ground samples will generate site-specific calibration standards with well-known concentrations.

## 3.4 Quality Control Samples

Quality control samples from this sampling effort include one equipment blank collected by combined rinsing of a decontaminated sampling tool (trowel or spoon), mixing bowl, and soil grinding tools (mortar and pestle or a grinding mill). Additionally, the lab will test one soil sample in duplicate and run matrix spike/matrix spike duplicate (MS/MSD) tests on one soil sample.

## 3.5 Data Evaluation

The sampling and analysis of soil samples collected prior to soil removal work will result in replicate FPXRF measurements exhibiting a broad range of arsenic concentrations and subjected to the following increasingly time- and labor-intensive sample processing steps:

- *In situ* spot measurements
- Intrusive “bag” tests
- Intrusive tests of sieved soil
- Intrusive tests of ground soil

Each of these results will have a corresponding “true value” as measured by EPA Method 6010. Data will be evaluated using linear regression of FPXRF results against laboratory results. Bias associated with the FPXRF measurements will be evaluated by comparing the slope of the regression line against an ideal 1:1 line. Precision of the FPXRF measurements will be evaluated by comparing relative standard deviations of the measurements and comparing confidence bands that bracket the linear regression models.

Information will be used to optimize sampling during subsequent soil removal work by adjusting sampling frequency estimates, developing action levels that account for any bias associated with the various FPXRF measurement methods, and scoping appropriate levels of sample preparation needed to inform soil removal decisions.

# 4 Soil Testing During Soil Removal

## 4.1 Soil Removal from Ditches

No field screening is planned for the soil removal work in the ditches along the railroad tracks, along Rock Creek Road, along Highway 18, and from the Rock Creek Gully. The only samples collected from these soil removal areas will be final confirmation samples (discussed in Section 5).

## 4.2 Soil Removal from Areas

### 4.2.1 Collection of FPXRF Screening Samples

At TPS-1, TPS-2, and WPS, field personnel will collect soil samples from newly excavated areas as contractors complete each cell. The contractor will survey and stake the limits of each cell. Samples will be tested in the field such that results are reported by the next morning.

Samples will be collected using a systematic (grid-based) sampling design that provides coverage for the entire excavation area. Soil samples from each grid point will be tested individually. Sampling patterns can be laid out as square, rectangular, or triangular grids (depending on the shape of the daily excavation area); however, Gilbert (1987, page 120) notes that a triangular grid is more likely to provide information on hot spots than a square grid. A triangular grid also minimizes the amount of soil that would need to be over-excavated if results exceeded the clean-up criteria. Grids will be laid out using measuring tape or a measuring wheel. Measurements will be taken from the survey stakes for each excavation cell.

Grid spacing will be designed to balance the number of samples analyzed in a 24-hour cycle with the amount of soil removed. Assuming that the excavation contractor may remove up to 500 cubic yards of soil in one day, the maximum area of soil removed as a 1-foot lift is 13,500 square feet. The excavation areas will be subdivided into 80- by 80-foot cells. A triangular grid providing coverage on a 25-foot grid spacing would have approximately 10 discrete sample locations per cell (Figure 1). Excavation of 500 cubic yards per day equates to roughly two cells or 20 samples – approaching the maximum number of samples that field personnel would be expected to sample, process, test, and report during a 24-hour cycle (sample throughput will be confirmed). As such, FPXRF samples will initially be collected on a 25-foot grid spacing throughout each excavation cell.

By using a 25-foot grid spacing, each sample is representative of approximately 625 square feet. The number of screening samples collected from the three excavation areas (with a combined area of approximately 4.23 acres) is estimated at 300 samples per 1-foot lift.

All soil sampling locations will be uniquely identified so that, if results indicate that additional soil removal is required, field personnel will be able to revisit the sampling location. Additionally, field personnel will measure grid locations relative to fixed positions, such as the surveyed boundaries of the daily excavation area or excavation cells (to be provided by the excavation contractor).

### 4.2.2 Testing of FPXRF Screening Samples

Soil samples will initially be tested for arsenic using an intrusive method designed to minimize measurement error. Soil samples will be dried (as needed), homogenized, ground, and packed into FPXRF test cells according to the procedures described in Attachment A. As experience with the methods grows and analysts become more comfortable with method performance, other, less time- and labor-intensive measurements may be used.

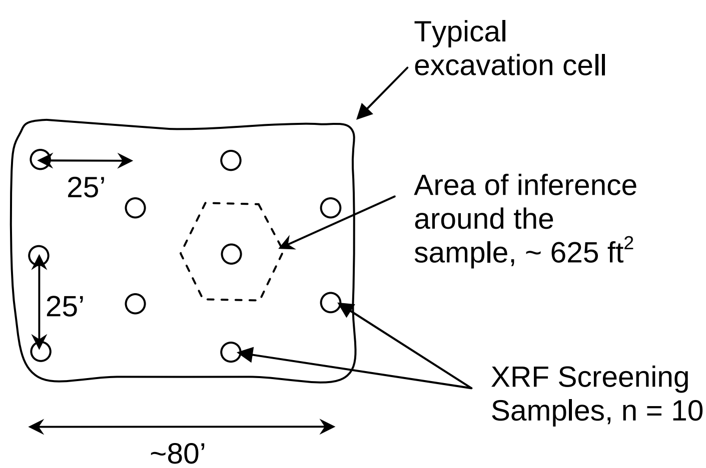
### 4.2.3 Evaluation of FPXRF Screening Results

If a sample result exceeds the 159 mg/kg CUL, field personnel will revisit the sampling location and remove an additional 1-foot lift of soil in the area of inference surrounding the sample (see Figure 1). Approximately 20 cubic yards of soil surround a sample from the middle of a triangular grid with a 25-foot grid spacing. The grid point will be resampled to evaluate arsenic concentrations in remaining soil after removal of the additional lift.

### 4.2.4 Quality Control Samples

Quality control samples associated with FPXRF screening samples include a daily duplicate sample in addition to the quality control samples described in Attachment A. EPA Method 6200 also recommends that one sample in twenty should be split and submitted to a laboratory for continuing method verification testing via EPA Method 6010.

FIGURE 1
Example of FPXRF Screening Sample Grid in an Excavation Cell.
*Taylor Lumber and Treating Superfund Site*



# 5 Soil Testing After Soil Removal

At the conclusion of soil removal work, several soil samples will be collected from the excavated ditches and surface soil areas to confirm attainment of the soil CUL.

## 5.1 Confirmation Samples from Ditches

Confirmation samples from ditches will be collected by generating composite samples that will be tested in the lab for total arsenic. Samples will be collected as follows:

- Divide ditches into segments of nominally equal lengths.
- Randomly select five sample points within each segment.
- Sample equal portions of soil from each sample point along the centerline of the ditch. Homogenize in a stainless steel mixing bowl.
- Submit samples to a lab for analysis of total arsenic via EPA Method 6010.

Samples will be tested on a rush turnaround-time basis, so that decisionmakers can evaluate results and backfill the ditches in a timely manner.

Details for confirmation samples from each of the ditches are described in Table 4.

TABLE 4
Confirmation Samples from Excavated Ditches
*Taylor Lumber and Treating Superfund Site*

| Ditch | Sample Plan |
|---|---|
| Railroad Ditch East (320 feet) | One 5-point composite sample from random locations along the ditch. |
| Railroad Ditch West (320 feet) | One 5-point composite sample from random locations along the ditch. |
| Rock Creek Road Ditch (1334 feet) | Two 5-point composite samples from random locations along the ditch. |
| Highway 19 Ditch (1329 feet) | Two 5-point composite samples from random locations along the ditch. |
| Rock Creek Gully | One 5-point composite sample from random locations along the ditch. |
| **Total:** | **7 samples.** |

## 5.2 Confirmation Samples from Surface Soil Areas

Confirmation samples from surface soil areas will be collected by generating composite samples that will be tested in the lab for total arsenic. Samples will be collected as follows:

- Divide the excavation areas into cells of nominally equal areas.
- Randomly select four sample points within each area.

- Sample equal portions of soil from each sample point and homogenize in a stainless steel mixing bowl.
- Submit samples to a lab for analysis of total arsenic via EPA Method 6010.

Samples will be tested on a rush turnaround-time basis, so that decisionmakers can evaluate results and backfill the excavations in a timely manner.

Details for confirmation samples from each of the excavation areas are described in Table 5. The compositing and random sample design is illustrated (for example purposes only) in Figure 2.

TABLE 5
Confirmation Samples from Excavation Areas
*Taylor Lumber and Treating Superfund Site*

| Area | Sample Plan |
|---|---|
| TPS-1 (2.36 acres) | 9 samples (4-point composites). |
| TPS-2 (1.57 acres) | 6 samples (4-point composites). |
| WPS (0.4 acres) | 3 samples (4-point composites). |
| Total: | 18 samples. |

## 5.3 Quality Control Samples

Quality control samples during confirmation sampling work includes an equipment rinsate blank collected each sampling day, one duplicate collected from a homogenized composite sample, and one pair of MS/MSD samples.

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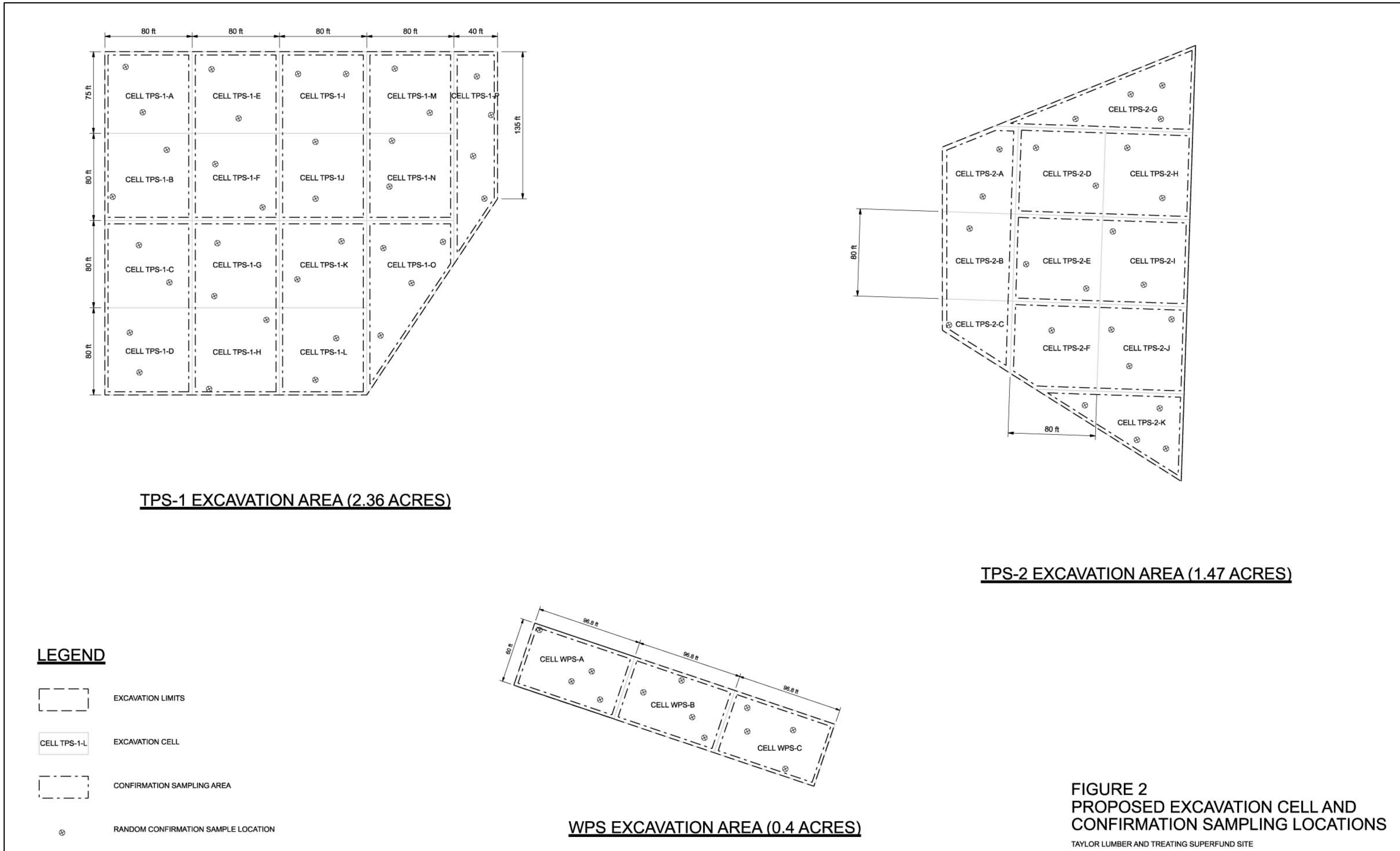


FIGURE 2
PROPOSED EXCAVATION CELL AND CONFIRMATION SAMPLING LOCATIONS

TAYLOR LUMBER AND TREATING SUPERFUND SITE

CH2MHILL

# Attachment 1 – FPXRF Standard Operating Procedure

Field samples will be analyzed by FPXRF to determine arsenic concentrations in soil and to decide if additional excavation will be required in a soil removal area. This method is applicable to both *in situ* and intrusive analysis of soil samples.

## Equipment and Materials

- Field lab area, running water, and power source (provided by contractor)
- 55-gallon drums for sample and decontamination waste disposal
- Field Portable X-Ray Fluorescence Instrument
- Soil Sampling Kit (Test stand, sample cups, mylar, etc.)
- Oven (< 150°C)
- Mill or Mortar and Pestle
- Lap Top Computer
- Sieves (#10 and #60) – sufficient numbers to process a batch of samples without recleaning a set of sieves
- Clean quartz sand and reference standards
- Dionized distilled water and detergent
- Field data sheets
- Bench data sheets

## Equipment Set-up

Set up and calibrate per manufacturers instructions.

Because the instruments have an x-ray source, operators of FPXRFs must be licensed by the Oregon Radiation Protection Services Office (Judy Smith, Oregon Radiation Protection Services, personal communication, October 16, 2006). This is accomplished by filling out a form and paying a licensing fee. Lead time for processing the licensing application is typically 1 to 2 weeks.

## In Situ Measurements

1. Remove large or non-representative debris before analysis (rocks, pebbles, leaves, vegetation, roots, asphalt, and concrete).
2. Smooth and tamp down soil surface so that probe window has good contact with the surface.
3. Take measurement directly from soil surface. Count time is dictated by the required detection limits.

Note: In situ measurements are only acceptable for dry soils. They will not work in submerged or water-saturated areas.

## Intrusive Measurements

### Sample Collection

1. Remove large or non-representative debris from the surface (rocks, pebbles, leaves, vegetation, roots, asphalt, and concrete).
2. Remove soil from a 4- by 4-inch square, 1-inch deep. Place in plastic bag or other sample container.

### Sample Processing

1. Homogenize soil sample in mixing bowl or by kneading soil in bag.
2. If soil is moist, dry material in oven (temperature < 150°C) for 1 to 2 hours.
3. Grind approximately 20-50 grams of soil until more than 90 percent passes through a #60 sieve (< 250 µm)
4. Fill sample cup and cover with mylar film.

Note: One method blank per run will be generated by carrying a sample of clean quartz sand through the sample preparation process.

### Sample Measurement

1. Confirm that the method/instrument is in control by testing:
    a. Instrument Blank (cell of clean quartz or a Teflon block) – test at beginning and end of each day. Instrument Response should be below method detection limits.
    b. Low Concentrations Calibration Verification Check Standard (just above the practical quantitation limit). This can be a site-specific calibration standard. Response should be within 20 percent of the true value. Precision of replicates should be within 20 percent RSD. Replicate standard deviation used to calculate method detection limit.
    c. Medium Concentration Calibration Verification Check Standard (near the CUL). This can be a site-specific calibration standard. Response should be within 20 percent of the true value.
2. Randomize the sequence of soil samples and method blank and test in sequence.
3. Retest instrument blank and medium concentration calibration verification check standard approximately once per every 20 samples.

APPENDIX D

# Air Monitoring Approach

# A Conceptual Approach for Monitoring $PM_{10}$ and Arsenic Ambient Air Concentrations Potentially Associated with the Taylor Lumber Remedial Action

| | |
|---|---|
| PREPARED FOR: | Karen Keeley/USEPA |
| PREPARED BY: | CH2M HILL |
| DATE: | November 13, 2006 |

## Introduction

This memorandum is generated to provide a conceptual approach for monitoring ambient concentrations of $PM_{10}$ and arsenic during the remedial action at the Taylor Lumber and Treating Superfund Site. This will be used by the Contractor in preparing a detailed Air Quality and Meteorological Monitoring Plan for EPA approval. The Contractor may find it advantageous to hire a subcontractor for this work.

This approach does not cover air monitoring for onsite workers. The Contractor will address that concern in the Health and Safety Plan.

Data quality objectives and action levels will be determined during the development of the air monitoring plan. $PM_{10}$ concentrations will be measured against National Ambient Air Quality Standards (NAAQS) and arsenic concentrations will be measured against a yet to be determined arsenic action level.

## Meteorological Station

At least one week prior to placement of air samplers, a meteorological station will be established at the site to obtain site-specific wind rose patterns that will be used to locate air samplers. Data from the station may also be used for air sampling calculations. Meteorological monitoring guidance is provided in EPA-454/R-99-005.

## Monitoring Program Scope and Siting

A minimum of three High Volume samplers[1] will be placed at Taylor Lumber. The samplers will be sited according to EPA monitoring guidance documents.[2] Beyond the Taylor Lumber east property boundary is Rock Creek Road, and several residences are directly across the road. By placing two monitors on the east property boundary in the breathing zone, ambient air moving from the remediation site to the residential area can be sampled to document that no adverse impact to human health occurred as a function of the remedial action.

[1] Or equivalent.

[2] 40 CFR Part 58, Appendices A through E provide monitor operation and siting guidance.

Depending on the wind rose patterns, a third sampler may be located on the west property boundary, to monitor $PM_{10}$ and arsenic concentrations in ambient air flowing from the site to the residence west of this boundary.

## $PM_{10}$ Sampling Methodology

$PM_{10}$ will be quantified in accordance with the Compendium of Methods for the Determination of Inorganic Compounds in Air, Compendium Method IO-2.1, "Sampling of Ambient Air for Total Suspended Particulate Matter and $PM_{10}$ using High Volume Sampler."

IO-2.1 samples a large volume of atmosphere (57,000 to 86,000 $ft^3$) with a high-volume blower, typically at a rate of 40 to 60 $ft^3$/min. The High-Volume sampler utilizes a reference orifice meter[3] calibrated mass flow controller[4] (mfc) to sense and control air volume sampled. A size-select inlet is utilized to collect particles less than 10 microns in aerodynamic diameter (10µm) on a glass fiber or quartz filter. A sample will be collected every 24 hours.

Following the sample period for method IO-2.1 the filter media is recovered from the sampler, the air volume calculated, and the particulate concentration for the sample period is determined gravimetrically.

## Alternative $PM_{10}$ Sampling Methodology

In lieu of Method IO-2.1, portable instruments may be used to measure real-time $PM_{10}$ concentrations with potentially less expense. There are several commercially available samplers that employ EPA approved equivalent methods. MetOne developed the portable E-BAM sampler that uses beta attenuation to measure $PM_{10}$. This company also developed the E-Sampler which uses light-scattering principles to estimate airborne particulates, real-time. The MIE DataRAM4 is a dual-wavelength, light scattering device that estimates particulate concentrations. These instruments are equipped with dataloggers that can be programmed to report as often as every minute, or to report hourly averages.

These sampling methods have the advantage of delivering more timely analytical results without the need for laboratory analysis, but may require more expertise to operate.

## Arsenic Sampling Methodology

Ambient arsenic samples will be determined utilizing Compendium of Methods for the Determination of Inorganic Compounds in Ambient Air, Compendium Method IO-3.3, "Determination of Metals in Ambient Particulate Matter using X-Ray Fluorescence (XRF) Spectroscopy." Following the analysis of recovered filter media and particulate matter via method IO-2.1, the recovered sample is analyzed utilizing XRF to determine arsenic metal concentrations in the media. Arsenic results will be reported as $\mu g/m^3$.

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3 The reference orifice meter is calibrated against a master flow meter certified by the National Institute of Standards and Technology (NIST).

4 A volumetric flow control system (vfc), which utilizes a "choked" venturi sonic condition, may be utilized instead of a mfc system.

## Alternative Arsenic Sampling Methodology

In lieu of utilizing Compendium Method IO-3.3 to determine ambient concentrations of arsenic, on-site arsenic concentrations in daily soil samples may be ratioed to approximate ambient concentrations of arsenic. While this method of arsenic is more cost effective, it will most likely bias concentrations high, significantly over-estimating ambient arsenic concentrations.

## Quality Control/Quality Assurance (QA/QC)

The accuracy of inorganic sampling methods IO-2.1 and IO-3.3 are highly dependent upon compliance with the promulgated method. As such, sampling methodology, sample preparation, calibration, and precision and accuracy modifications can significantly affect analytical results. Method requirements should be considered carefully in order to faithfully accomplish sampling and analysis methodologies described in IO-2.1 and 3.3.

More frequent sampling should occur during the beginning of the project with possible reductions in frequency as the success of dust minimization efforts (e.g., BMPs, wetting) are documented.

## Background Concentrations

This conceptual approach does not advocate attempting to determine background $PM_{10}$ and arsenic concentrations, which would require upwind sampling as well as meteorological measurements. Because both $PM_{10}$ and arsenic are ubiquitous biogenic air contaminants, the determination of a representative ambient background concentration would be difficult, and attempts at defining source contribution equally daunting and costly. Instead, this memorandum suggests simply establishing that ambient concentrations between the remediation activity and residential areas are significantly below established thresholds for $PM_{10}$ and arsenic, and remained so for the duration of the remediation activity.

In the event that air monitoring results indicate concentrations in the vicinity of $PM_{10}$ NAAQS or the arsenic action level, additional monitors and the meteorological station could be employed to estimate background levels and or source contribution.

## APPENDIX E

# Construction Quality Assurance Plan

*Report*

# Taylor Lumber and Treating Superfund Site Construction Quality Assurance Plan

Prepared for

**U.S. Environmental Protection Agency**

**EPA Contract No. 68-S7-04-01**

**Task Order No. 024-RD-RD-10F1**

December 2006

Prepared by

CH2MHILL

CVO/063350019

# Contents

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# Acronyms and Abbreviations

| | |
|---|---|
| AASHTO | American Association of State Highway and Transportation Officials |
| ARARs | applicable or relevant and appropriate requirements |
| ASTM | American Society for Testing Materials |
| CFR | Code of Federal Regulations |
| CM | Construction Manager |
| CQA | Construction Quality Assurance |
| EPA | U.S. Environmental Protection Agency |
| ODEQ | Oregon Department of Environmental Quality |

**SECTION 1.0**

# Introduction

This Construction Quality Assurance (CQA) Plan was prepared by CH2M HILL for the Taylor Lumber and Treating Remedial Action project being undertaken by the U.S. Environmental Protection Agency (EPA). The need for CQA Plans is described in both Federal (40 CFR Section 264.19) regulations. The CQA Plan sets forth responsibilities and procedures to evaluate completion of applicable project requirements in accordance with the cleanup goals and applicable or relevant and appropriate requirements (ARARs).

This plan describes CQA procedures for construction of the remedial action. In addition, this plan outlines the specific field and laboratory testing and monitoring procedures required to demonstrate that the remedial action, with particular focus on contaminated soil excavation, soil screening, backfill and grading, and asphalt paving, is constructed in accordance with the design specifications and drawings.

The CQA plan provides explanations of the following:

- Qualifications and responsibilities (Section 2)
- Project meetings (Section 3)
- Construction inspection activities (Section 4)
- Testing program (Section 5)
- Documentation (Section 6)

At the completion of the work, a final CQA report, including as-built drawings, will be prepared to document that the materials and construction processes comply with the Taylor Lumber and Treating remedial design plans and specifications.

EPA has indicated that they intend to procure CH2M HILL as the Remedial Action Oversight Contractor. The scope of this contract has not been defined, and therefore the work described in this plan is based on typical project requirements, and may vary from the final scope of work used in the procurement of the remedial action oversight contract.

SECTION 2.0

# 2 Qualifications and Responsibilities

The remedial action and the CQA Plan will be implemented by the CQA Team with the qualifications and responsibilities described below. Figure 2-1 is an organization chart.

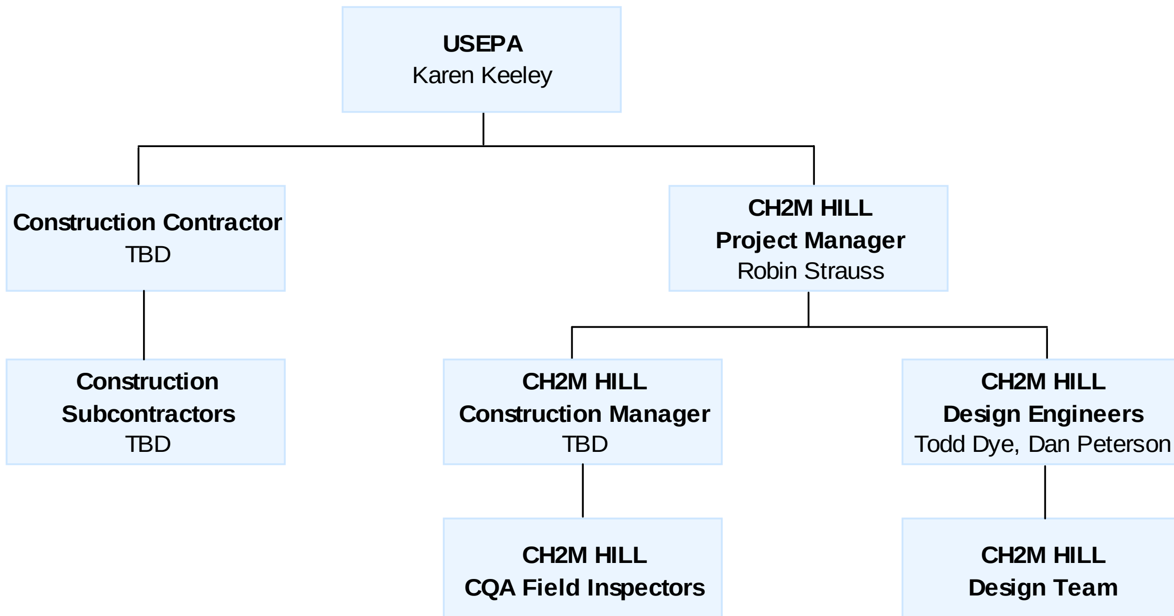


FIGURE 2-1
Taylor Lumber Organization Structure
*Taylor Lumber and Treating Superfund Site CQAP*

## 2.1 Construction Manager

The Construction Manager (CM) will be a qualified engineer from CH2M HILL, independent from the Construction Contractor. The CM will have the practical, technical, and managerial experience to properly implement the remedial action and the CQA Plan. The CM must be able to communicate effectively with design engineers, CQA Field Inspectors, laboratories and the Contractor to facilitate a clear understanding of construction activities and the CQA Plan.

The CM will be responsible for monitoring implementation of the plan, inspections, construction observations, sampling, and testing oversight. The CM's major duties and responsibilities will be as follows:

- Review all design plans and specifications for accuracy and completeness. If clarifications or adjustments are required in the design plans or specifications, the CM will contact the lead design engineer and resolve the issue

- Educate CQA Field Inspectors about CQA requirements and procedures pertaining to construction of the entire remedial action
- Prepare a schedule of CQA inspection activities and coordinate necessary CQA personnel to conduct inspections
- Attendance at all Pre-construction and Construction Problem or Deficiency meetings
- Review and interpret data and reports prepared by CQA inspection personnel
- Identify and recommend work that should be either accepted or rejected on the basis of observations and/or test results (the CM may require special testing, inspections, or approval in areas of questionable quality or deviations from design specifications)
- Monitor the Contractor's quality control program

Testing oversight will be the responsibility of the CM. The Contractor will retain one or more testing firms to perform quality control materials testing throughout the project.

## 2.2 CQA Field Inspectors

The CQA Field Inspectors will have formal training and practical experience in inspecting and testing construction work, including conducting and recording inspection activities, preparing daily reports, and performing field testing. In addition, knowledge of codes and regulations involving materials handling, observation of testing procedure, equipment, and reporting procedures will be required.

One or more CQA Field Inspectors work under the supervision and guidance of the CM. CQA Field Inspectors will perform onsite inspections and will evaluate whether the work meets the requirements of the Construction Documents. The CQA inspection personnel will perform various tests and observations during construction such as:

- Ensuring that all testing equipment is properly calibrated on a regular basis and that the calibration is documented
- Accurately recording all test data and organizing them in a manner that allows easy reference
- Evaluating the Contractor's construction quality control plan to ensure that it meets or exceeds the CQA Plan requirements
- Reporting observations and test results to the CM as the work progresses.

Field tests and visual observations will be used to evaluate construction practices. If CQA personnel observe poor construction practices, the CM will be notified immediately. CQA inspection personnel will be responsible for verifying that all testing is conducted in accordance with American Society for Testing Materials (ASTM) standards or other specified test methods and that the proper test equipment is used. The results of all inspections, including work that is unacceptable, will be reported to the CM.

## 2.3 Contractor

The Contractor is responsible for constructing the remedy in conformance with design plans, specifications, and this CQA Plan. The Contractor is also responsible for all work performed by the Contractor or their Subcontractors. The Contractor must be qualified to perform the respective work items and must allow and assist the CQA Team to perform the required monitoring.

The Contractor will perform materials acceptance testing as required by the project specifications. In addition, the Contractor will provide all equipment to perform testing of material compaction as required by the specifications. The Contractor shall provide all necessary equipment required to complete the work in accordance with the specifications.

The Contractor's Site Supervisor shall:

- Have formal training and practical experience in construction management
- Have specific knowledge of earthwork construction, equipment capabilities, dust and erosion control, and soil compaction techniques

Contractor's work crew shall:

- Have demonstrated experience in the type of work to be performed
- Be supervised by persons with over 5 years of experience in earthwork-related projects
- Demonstrate compliance with site safety programs and OSHA regulations pertaining to Hazardous waste site construction.

## 2.4 Definitions

**Design Engineer**. The design engineer refers to the CH2M HILL design lead that supervised preparation of the remedial design. The design engineer will review and approve submittals and will be consulted to resolve design issues that arise during construction.

**CQA Team**. The CQA Team includes CH2M HILL's CM, CQA Field Inspectors (described above), and CH2M HILL design engineers as appropriate.

## 2.5 Project Management

### 2.5.1 EPA

U. S. Environmental Protection Agency, Region 10
1200 Sixth Avenue, ECL-111
Seattle, WA 98101
Contact: Karen Keeley
Superfund Project Manager
Phone: (206) 553-2141

### 2.5.2 ODEQ

Oregon Department of Environmental Quality
Western Region
1102 Lincoln Street, Suite 210
Eugene, OR 97401
Contact: Norm Read
Project Manager
Phone: (541) 687-7348

### 2.5.3 CH2M HILL Staff

CH2M HILL, Inc.
2300 NW Walnut Blvd
Corvallis, OR 97330
Construction Manager: TBD
Project Manager: Robin Strauss (541) 768-3520
Design Engineers: Todd W. Dye, PE (541) 768-3403, Dan Peterson, PE (541) 768-3579

**SECTION 3.0**

# 3 Project Meetings

Periodic meetings shall be held throughout the duration of the restoration construction to enhance communication between the CM, CQA Field Inspectors, Design Engineers/Project Manager (as required), and the Contractor. These meetings will aid the personnel involved in construction activities in becoming familiar with facility design, construction procedures, and recent design changes, if any. Meetings to be conducted during construction are:

- Pre-construction Meeting
- Progress Meetings
- Problem or Work-deficiency Meetings (as needed)

## 3.1 Pre-construction Meeting

A Pre-construction Meeting will be held prior to the start of construction activity. Parties who should attend this meeting are: the EPA, Project Manager, Design Engineers, CM, CQA Field Inspectors, and the Contractor. The purpose of this meeting will be to resolve any uncertainties regarding the construction document requirements, the CQA Plan, and construction procedures. The meeting will cover the following:

- Each party will be supplied with relevant documents and supporting information.
- The CQA Plan will be explained with respect to design criteria, plans, and specifications.
- Any changes to the CQA Plan that are needed to meet or exceed the specified design will be identified.
- Each party's responsibilities will be reviewed and discussed, with communication lines identified.
- Key personnel will be identified.
- The project schedule will be reviewed.
- Protocol for field observations and field tests will be explained.
- Protocol for handling construction deficiencies, repair work, and retesting will be discussed.
- Protocol for document reporting, handling, distribution, and storage during construction will be discussed.
- Procedures to protect construction materials from adverse effects of weather during construction and storage will be discussed.
- Work area and safety protocols will be discussed.

- A site inspection will be conducted to discuss work areas, work plans, stockpiling, and lay down areas, and other site or construction issues.

## 3.2 Progress Meetings

Progress Meetings shall be held weekly to review the previous week's activities or progress, discuss present and future work, and discuss any current or potential construction problems. The meetings should be attended by CQA staff, the CM or project manager, and Contractor. The Owner (Pacific Wood Preserving of Oregon) or Owner's representatives should also be invited to attend these meetings to facilitate communication and coordination with the Owner. All Progress Meetings will be documented by CH2M HILL and minutes will be transmitted to all parties, including EPA and ODEQ.

## 3.3 Problem or Work-deficiency Meetings

Special meetings will be held when a problem or deficiency is occurring or is likely to occur that will have a major impact on the project schedule or cost. These meetings shall be attended by EPA, Design Engineer or Project Manager, the CM, and the Contractor. The purpose of these meetings is to identify a problem or deficiency in the construction work, review alternative solutions, and select and implement a plan to resolve the problem or deficiency. CH2M HILL will document the meetings, and transmit minutes to all parties, including EPA.

SECTION 4.0

# 4 Inspection Activities

The CQA Team will conduct inspection activities throughout remedial action construction to document compliance with project plans and specifications. These activities are divided into preconstruction, construction, and post-construction activities. Record forms for these activities are included in Attachment 1 of this Plan.

## 4.1 Preconstruction

The CM will conduct preconstruction training and information sessions with the CQA Team to familiarize them with the specified design, the inspection policies, and the procedures. Preconstruction inspection activities of the CQA Team will include the following:

- Reviewing and becoming familiar with all design criteria, drawings, and specifications associated with construction of the cover system components
- Review the Contractor's work schedule
- Looking for inconsistencies in the design plans and specifications. Any inconsistencies will be discussed with and resolved by the design engineer
- Closely reviewing detailed specifications and reports that pertain to excavation activities, soil screening processes, and construction of the low-permeability asphalt cover
- Reviewing Contractor's certifications, submittals, test results, sources, and samples of imported earthwork materials for acceptance requirements described in the specifications and this CQA Plan
- Reviewing Contractor's proposed construction procedure for design and specification compatibility and constructability

## 4.2 General Construction

In addition to specific inspection duties listed in the following paragraphs, CQA Field Inspectors will inspect the Contractor's equipment, materials and operations to verify compliance with the protection requirements of Sections 01500 Construction Facilities and Temporary Controls, and 01570 Soil Erosion and Sediment Control. Construction inspection activities of the CQA Team will include the following:

- Verify that materials are as specified or approved by the design engineer and CM
- Record any damage to the compacted layers or asphalt cover resulting from operation of equipment

- Observe all phases of construction and documenting the Contractor's compliance or noncompliance with the approved plans, specifications, and the directions of the CM
- Review Contractor submittals, samples, and supporting test reports and verifying that all documentation required by the specifications have been received and are in compliance
- Verify that all lines and grades have been checked by the project surveyor before subsequent component construction

## 4.3 Excavation, Grading, and Backfill

CQA Field Inspectors will oversee excavation, grading and backfill operations to assure work and materials meet the requirements of the construction plans and specifications. Construction inspection activities will include the following:

- Review Contractor's excavation plan for completeness including methods, sequencing and proposed locations for stockpiling and placement of materials.
- Inspect excavation to verify:
  - Proper protection of trees is as specified and stumps are grubbed per construction plans and specifications.
  - It has been performed to the lines and grades identified in the construction plans.
  - Excavation support is provided where necessary to protect existing facilities, property, and completed work.
- Verify that proper erosion and sediment controls are in place to prevent contaminated stormwater from flowing from the soil contamination areas drainage ditch excavations to Rock Creek or the South Yamhill River.
- Verify that sediment is adequately removed from culverts along Rock Creek Road and Highway 18B.
- Conduct field screening testing and confirmation sampling of soil from the selected excavations in accordance with the Soil Sampling and Analysis Plan described in Appendix C. Advise CM based on confirmation sampling and testing of acceptance or of additional excavation required
- Observe excavation operations to verify suitability of excavated soils for screening. Verify that saturated soils, soils with high percentages of fine-grained materials, organic materials, trash, or debris are not transported to the screening operation.
- Review proposed fill and backfill quality test results (see Section 5) from Contractor for:
  - Appropriate gradation, per specifications
  - Required composition, gradation, organic matter, and pH for earthfill to be used in areas to be vegetated.

  - Gradation, relative compaction and moisture content as materials are placed; where field density tests or moisture contents fail to meet specified values, notify the Contractor to rework the area or remove the material

- Inspect fill and backfill operations to verify construction methods meet specification requirements
- Verifying that cracks, depressions, and irregularities are filled in and compacted to the specified relative compaction
- Measuring compacted lift thickness, which must not exceed design specifications
- Observing the type of equipment and number of passes used in compaction and identifying areas that have been poorly compacted
- Identifying any material changes
- Supervise engineer's surveyors for the purposes of measurement and payment and determining that minimum thicknesses of backfill layers have been achieved

## 4.4 Screening Excavated Material

Excavated soil from selected areas will be screened to separate coarse-grained materials and fine-grained materials. CQA Field Inspectors will oversee screening operations to assure work meet the requirements of the construction plans and specifications. Specifically CQA Field Inspectors shall:

- Verify that the excess fines do not adhere to coarse-grained materials and that coarse-grained materials meet gradation testing requirements.
- Verify that excess organic materials, trash, debris, or other objectionable materials are not mixed with coarse-grained materials.
- Verify that hazardous and non-hazardous soil materials are stockpiled separately before and after screening.
- Verify that screening stockpiles are covered and protected appropriately to prevent wind and stormwater erosion, and excess wetting by rain.
- Verify that the surface beneath the screening equipment does not have excess water from the dust control measures that will contaminate the subsurface soils.
- Maintain accurate records of screening operation and placement
- Observe screening operations to ensure dust levels are maintained according to the Contractor's Air Quality Monitoring Plan developed in accordance with the Air Monitoring Approach provided in Appendix D.

## 4.5 Soil Disposal

CQA Field Inspectors will oversee soil disposal operations to assure work meet the requirements of the construction plans and specifications. Specifically CQA Field Inspectors shall:

- Verify trucks are weighed before and after loading
- Verify that trucks are properly lined and covered to prevent spread or loss of contaminated soil during transport
- Verify soil characterization sampling performed and soil meets landfill acceptance criteria

## 4.6 Paving Construction

Paving construction includes repair and reconstruction of the existing asphalt cover, followed by installation of a low-permeability asphalt concrete cover. The final design specifies use of a proprietary asphalt binder material known by its trade name, MatCon™.

CH2M HILL submitted a Justification for Other Than Full and Open Competition form to EPA to provide rationale for specification of this proprietary material. This material, while proprietary, uses commonly available aggregate materials, and can be installed by numerous qualified paving contractors using standard paving equipment. In order to meet the manufacturer’s installation warranty requirements, the manufacturer provides design of the asphalt mix formula, quality control at the hot mix asphalt plant, and quality control oversight during installation.

In addition to the manufacturer-provided QA services, CQA Field Inspectors will oversee paving operations to assure work and materials meet the requirements of the construction plans and specifications. The CQA Field Inspectors shall:

- Inspect Contractor’s repair operations of the existing asphalt cap to assure proper pavement repair or reconstruction to provide suitable support for MatCon™ placement.
- Review proposed asphalt test reports, manufacturer’s certificates and testing laboratory statement of qualifications
- Inspect operation, placement and testing of asphalt control strip to verify compaction and target density
- Monitor proposed paving schedule and environmental conditions to verify Contractor meets the specified requirements
- Inspect Contractor’s MatCon™ placement operations to verify compliance with specifications
- Review Contractor field testing, laboratory certification, testing methods and frequency, of MatCon™ cover to verify compliance permeability requirements

- Record the MatCon™ Installer's certification of subsurface acceptability, MatCon™ material warranty, MatCon™ Installer's certification of acceptable installation, and MatCon™ installation warranty.

## 4.7 Prefinal Inspection

Upon completion of construction, a prefinal inspection will be conducted by EPA, ODEQ, the Project Manager and the CQA Team to verify that all construction activities are complete and to identify a punch list of items requiring corrective attention by the Contractor.

The inspection will include, at least, the following:

- Verification that all components of the remedy construction outlined in the construction plans and specifications is complete
- Identification of surface areas that are damaged or improperly compacted
- Identification of areas that have been excessively eroded by rainfall during construction or otherwise disturbed as a result of construction activities
- Identification of damage to permanent structures in the vicinity of construction resulting from construction activities
- Review of the integrity of all paved areas
- Verification that all areas impacted by construction have been restored and that all construction debris has been removed.
- Confirmation that all required submittals and Record Drawings information have been submitted and are in good order

## 4.8 Final Inspection

After all deficiencies or outstanding items identified in the pre-final inspection have been corrected or resolved, a final inspection will be performed by the EPA, ODEQ, the Project Manager, Design Engineer, the CM, and the Contractor. This inspection will review all items identified in the pre-final inspection and include a final review of all construction activities.

**SECTION 5.0**

# 5 Testing Program

A testing program will be implemented to verify that all components of the remedial action are constructed in accordance with design drawings and specifications. The Contractor, the manufacturer, or a qualified testing service will conduct all tests under the observation of the CQA Team. General test procedures and frequencies, as proposed for CQA inspection, are shown in Tables 5-1 through 5-4. Documentation and reporting of test results will be in accordance with requirements described in the Documentation section of this CQA Plan (Section 6). The testing procedures and frequencies summarized in this CQAP are for general use and reference by the CQA Team and do not include all testing and inspection requirements. For a complete listing of testing requirements the Contractor should consult the design specifications.

The testing program is divided into material acceptance tests and compliance tests. The Contractor performs material acceptance tests before construction to verify materials proposed for use will comply with the specifications. Compliance tests are performed by the Contractor throughout construction of the remedy to verify that the components are constructed in compliance with the project plans and specifications.

## 5.1 Backfill and Grading Material Testing

The CQA Team will perform the following duties and tests for backfill and grading materials:

- Determine the relative compaction and moisture content of the imported soil and graded soil and compare with established relationship between moisture content and dry density.
- Require that the Contractor recompact areas where field density test results indicate that specified design requirements are not met, and then retest the soil for relative compaction.
- Select random testing locations for the soil components.
- Coordinate with soils testing laboratory to have appropriate laboratory tests performed. All testing shall be performed in accordance with the appropriate testing method required by the specifications.

### 5.1.1 Backfill and Grading Material Acceptance Tests

Backfill and grading material acceptance testing will be performed by the Contractor with the results supplied to the CM for approval of the material prior to its use on the project. Backfill and grading material acceptance tests and testing frequencies required for the various components are listed in Table 5-1 together with the recommended tests and frequencies.

### 5.1.2 Backfill and Grading Material Compliance Tests

Compliance tests, frequencies, and methods proposed for the various components are listed in Table 5-2. Compliance testing will be performed on the placed materials by the Contractor's independent testing agency and overseen by the CQA Team. The Contractor is responsible for meeting the specification criteria for density, moisture, and final earth material thickness. The project specifications define the Contractor's responsibilities in detail. Table 5-3 provides lift thickness requirements for placement of earth backfill and grading materials.

## 5.2 Pavement Compliance Testing

The repaired asphalt and MatCon™ cover will be tested by the Contractor during installation. Testing requirements are outlined in Table 5-4. Complete testing and construction requirements are defined in the project specifications.

Testing will be performed by the Contractor in accordance with the specifications under the observation of the manufacturer's QA representatives and the CQA Team. During testing operations, the duties of the CQA Team include the following:

- Observe testing performed by the Contractor and obtain copies of test records completed by the Contractor.
- Verify that the Contractor records the location, date, test number, technician name, and results of all testing
- Mark any failed areas with a waterproof marker compatible with MatCon™ (spray paint should not be used), and inform the Contractor and the CM of any required repairs
- Verify that all testing is completed in accordance with the project specifications
- Verify that all repairs are completed and tested in accordance with the project specifications

**Hydraulic Conductivity Testing**. Hydraulic conductivity testing will be performed by the Contractor under the observation of the CQA Team to verify that the low-permeability asphalt overlay meets the design hydraulic conductivity of $1x10^{-8}$ cm/sec. Sufficient samples will be collected by the Contractor at locations determined by the manufacturer's QA representative or Engineer. The Contractor will ship core samples to a third party laboratory for testing.

During core sampling, the CQA Team will perform the following:

- Identify to the Contractor locations to be cored
- Observe sample cutting
- Mark each sample with an identifying number
- Record sample location on the layout drawing
- Record the sample location, weather conditions, and reason sample was taken on the Hydraulic Conductivity Test Sheet form

- Request additional tests if the core does not meet specification requirements;
- Locate, describe, and document all asphalt cover repairs

## 5.3 Action on Failing Tests

The results of all tests, whether laboratory or field, passing or failing, must be reported in the Daily Inspection Diary Sheets or other appropriate data sheets as provided in Attachment 1 of this CQA Plan. Tests that do not meet the requirements of the specifications or this CQA Plan call for the following actions:

- Retests may be performed on the failed sample prior to taking corrective action.
- The area or volume of material represented by the failing test will be assessed so that appropriate remedial measures may be evaluated. If a design revision is required, the Engineer will be contacted. Additional tests will be used to define the affected area, as necessary.
- The Contractor’s superintendent and the CM will be immediately advised of the failing test results.
- The CM will determine the appropriate corrective action and inform the Contractor and design engineer regarding said action. If the Contractor cannot correct the problem, the CM and design engineer will recommend alternative solutions to EPA for approval.
- The required corrective action, the results of verification testing, and other documentation regarding the corrective action will be recorded.

TABLE 5-1
Grading and Backfill Material Acceptance Testing-General Gradation, Durability and Chemical Testing Requirements
*Taylor Lumber and Treating Superfund Site*

| Material Type | Test | Method | Specification | Frequency[a] | Criteria |
|---|---|---|---|---|---|
| Imported Granular material | Gradation | ASTM C117<br>ASTM C136 | Section 02316 | 1 test/1,500 tons of finished product | Max 8% passing No. 200 Sieve |
| Screened Granular Material | Gradation | ASTM C117 | Section 02799 | 1 test/ 250 cubic yards | Max 5% passing no. 200 by weight |
| | Gradation | ASTM D422 | Section 02799 | 1 test/1,000 cubic yards | Well-graded as defined in Specification |
| | Objectionable Material Content | Visual Inspection | Section 02799 | Hourly during screening operations | Coarse-grained materials should be free from excess objectionable materials. |
| Base Course Rock | Gradation | AASHTO T11, AASHTO T27 | Section 02710 | 1 test/1,500 tons of finished product | Gradation as defined for 1-inch as specified in Section 02630 of the Standard Specifications. |
| | Density (Maximum Density) | AASHTO T99, Method D | Section 02710 | One test for every aggregate gradation produced | |
| Gravel Surfacing | Gradation | AASHTO T11, AASHTO T27 | Section 02710 | 1 test/1,500 tons of finished product | Gradation as defined for 3/4-inch as specified in Section 02630 of the Standard Specifications. |
| Moisture | Density (Maximum Density) | AASHTO T99, Method D | Section 02710 | One test for every aggregate gradation produced | |
| Bedding Material | Gradation | ASTM D1140<br>ASTM C136 | Section 02320 | 1 per source or material change | Less than 5% by weight passing No. 200 Sieve<br>Maximum particle size based on pipe material and diameter as specified |
| Moisture<br>Pipe Zone Material | Gradation | ASTM D1140<br>ASTM C136 | Section 02320 | 1 per source or material change | Less than 5% by weight passing No. 200 Sieve<br>Maximum particle size based on pipe material and diameter as specified |

TABLE 5-1
Grading and Backfill Material Acceptance Testing-General Gradation, Durability and Chemical Testing Requirements
*Taylor Lumber and Treating Superfund Site*

| Material Type | Test | Method | Specification | Frequency[a] | Criteria |
|---|---|---|---|---|---|
| Drain Rock | Gradation | ASTM C117<br>ASTM C136 | Section 02320 | 1 per source or material change | <u>Sieve Size Percent Passing</u><br>1-1/2 in 100<br>¾ in 80-100<br>3/8 in 20-40<br>No. 4 4-10<br>No. 200 2% Maximum |
| Class 50 Erosion Protection Rock | Abrasion Resistance | ASTM C-535 | Section 02374 | 1 per source or material change | Maximum 35% wear |
| | Gradation | -- | Section 02374 | 1 per source or material change | <u>Weight (pounds)</u> <u>Percent by Weight</u><br>50-30 20<br>30-15 30<br>15-2 40<br>2-0 10-0 |
| Class 200 Erosion Protection Rock | Abrasion Resistance | ASTM C-535 | Section 02374 | 1 per source or material change | Maximum 35% wear |
| | Gradation | -- | Section 02374 | 1 per source or material change | <u>Weight (pounds)</u> <u>Percent by Weight</u><br>200-140 20<br>140-80 30<br>80-8 40<br>8-0 10-0 |
| Railroad Ballast | Abrasion Resistance | ASTM C-535 | Section 02316 | 1 test/1,500 tons of finished product | Maximum 35% wear |
| | Gradation | ASTM C136 | Section 02316 | 1 per source or material change | AREMA Standard 4A |

TABLE 5-1
Grading and Backfill Material Acceptance Testing-General Gradation, Durability and Chemical Testing Requirements
*Taylor Lumber and Treating Superfund Site*

| Material Type | Test | Method | Specification | Frequency[a] | Criteria |
|---|---|---|---|---|---|
| Topsoil | Composition | USBR 514.4.4 | Section 02911 | 1 per source or material change | Gravel –sized fraction: max 5% retained on No. 10 sieve<br>Sand –sized fraction: max 65% passing No. 10 sieve and retained on No. 270 Sieve<br>Silt –sized fraction: max 50% passing No. 270 sieve and larger than 0.0002 millimeter.<br>Clay –sized fraction: max 25% smaller than 0.0002 millimeter.<br>Organic Matter<br>pH range: 6.0 to 7.2 |
| | Organic Matter | USBR 514.8.7 | Section 02911 | 1 per source or material change | Organic Matter: minimum 1.5% by dry weight |

Note:
[a]The proposed frequency corresponds to each material from each source. Additional testing may be performed if deemed appropriate by CH2M HILL.
AASHTO = American Association of Highway and Transportation Officials
ASTM = ASTM International
USBR = United States Bureau of Reclamation

TABLE 5-2
Backfill Placement Compliance Testing
*Taylor Lumber and Treating Superfund Site*

| Material Type | Test | Method | Specification | Frequency[a] | Criteria |
|---|---|---|---|---|---|
| Imported Granular material | In-Place Density | ASTM D698<br>ASTM D1556 | Section 02316 | 1 test/lift or 5 tests/lift/acre whichever is greater | 95% relative compaction |
| Screened Granular Material | In-Place Density | ASTM D698<br>ASTM D1556 | Section 02316 | 1 test/lift or 5 tests/lift/acre whichever is greater | 95% relative compaction |
| Base Course Rock | In-Place Density and Moisture Content | AASHTO T310, and AASHTO T265 for moisture content | Section 02710 | 1 test/1,000 square feet of area/lift | 95% relative compaction |
| Gravel Surfacing | In-Place Density and Moisture Content | AASHTO T310, and AASHTO T265 for moisture content | Section 02710 | 1 test/1,000 square feet of area/lift | 95% relative compaction |
| Earth Fill | In-Place Density | ASTM D698 | Section 02316 | 1 test/lift or 5 tests/lift/acre whichever is greater | 95% relative compaction |

Notes:
[a]The proposed frequency corresponds to each material from each source. All sources will be tested at this frequency. Additional testing may be performed if deemed appropriate by CH2M HILL.
AASHTO = American Association of Highway and Transportation Officials
ASTM = ASTM International

TABLE 5-3
Fill and Backfill Material Lift Thickness Requirements
*Taylor Lumber and Treating Superfund Site*

| Material Type | Lift Thickness |
|---|---|
| Import Granular Material | 8 inches maximum (compacted) |
| Screened Granular Material | 8 inches maximum (compacted) |
| Base Course Rock | 6 inches maximum (compacted) |
| Bedding Material | Two equal lifts if total depth exceeds 8 inches (compacted) |
| | Minimum Thickness as follows: |
| | 1. Pipe 15 inches and smaller: 4 inches |
| | 2. Pipe 18 to 36 inches: 6 inches |
| Pipe Zone Material | ½ pipe diameter maximum for pipes < 10 inches in diameter |
| | 6 inches maximum for pipes > 10 inches in diameter |
| Class 50 Erosion Protection Rock | 12 inches minimum thickness (no compaction required) |
| Class 200 Erosion Protection Rock | 18 inches minimum thickness (no compaction required) |
| Earth Fill | 8 inches maximum (compacted) |
| Topsoil | Place ½ of total depth of topsoil and work into top 4 inches of subgrade. Place remainder of topsoil to depth of 4 inches. |

TABLE 5-4
Paving Material Compliance Testing
*Taylor Lumber and Treating Superfund Site*

| Material Type | Test | Method | Specification | Frequency[a] | Criteria |
|---|---|---|---|---|---|
| Heavy Duty Asphalt | Field Density | AASHTO T230<br>AASHTO T166<br>ASTM D2950<br>ASTM D2041 | Section 02772 | Once every 500 tons of mix or once every 4 hours, whichever is greater | 95% of mix design unit weight at optimum asphalt content |
| Low-Permeability Asphalt (MatCon™) | Field Density | AASHTO T230<br>AASHTO T166<br>ASTM D2950<br>ASTM D2041 | Section 02772 | Once every 500 tons of mix or once every 4 hours, whichever is greater, or as directed by manufacturer. | Maximum 3% void content as determined by the job mix formula |
| | Hydraulic Conductivity | ASTM D5084 | Section 02772 | one 4-inch core/sample for every 20,000 square feet of paving or as directed by manufacturer | Maximum coefficient of hydraulic conductivity of $1x10^{-8}$ cm/sec. |

Notes:
[a]The proposed frequency corresponds to each material from each source. All sources will be tested at this frequency. Additional testing may be performed if deemed appropriate by CH2M HILL.
AASHTO = American Association of Highway and Transportation Officials
ASTM = ASTM International

**SECTION 6.0**

# 6 Documentation

## 6.1 Daily Progress Report

A daily progress report will be prepared by the CM and CQA Field Inspectors with supporting inspection data sheets and records of any problems that occur or corrective measures implemented throughout the day. The daily progress report will include the following:

- Date, name of project, and location
- Weather and site conditions
- Summary of any meetings conducted and the results of the meetings
- Location of daily construction activities and progress
- Record of equipment and personnel working in a particular area
- Location of work being tested and areas passing inspection
- Description of any materials received at the site and the condition in which they were received
- Record of equipment calibrations or re-calibrations of test equipment and any actions taken as a result of re-calibration
- Record of site visits by non-project persons with names and affiliations
- Identification of construction problems and their solution or disposition
- Signature of CQA Inspector

## 6.2 Inspection Data Sheets

All field observations and field testing will be recorded on the various inspection data sheets included in Attachment 1. These sheets will be used to support the daily progress reports. All field testing will follow applicable ASTM or other specified standardized test procedures and methods of data recording unless otherwise indicated in the specifications or construction plans. Observations in the field may take the form of notes, charts, drawings or sketches, photographs, or any combination of the above. The inspection data sheets will have the following information:

- Description and title of the inspection activity
- Location of the inspection activity
- Recorded observation and/or test data, having all calculations completed and checked
- Comparison of test results and observations with specification requirements

- Names and titles of all persons involved in the inspection activity
- The recording of any material or workmanship which does not meet specified designs
- The recording of all corrective action measures undertaken and their results
- Signature of the CQA Inspector or person performing the test

## 6.3 Photographic Reporting Data Sheets

Color photographs will be taken during various stages of construction to help document field testing, construction activities and progress, and general inspection observations. Each photograph will have the following documentation:

- The date, time, and location the photograph was taken
- Description of the work or subject matter in photograph
- Name of the photographer

All photographs will be kept in chronological order in a protective file. The negatives or digital files will be stored in a separate file from the photographs, unless otherwise directed by the EPA.

The CM and/or CQA Inspector may supplement still photography with videos. The videos should have a narrative provided on the tape and should serve as a pictorial record of work progress, problems, and corrective measures. The tapes should be documented and stored in the same manner as the still photography.

## 6.4 Acceptance of Completed Components

Daily Progress Reports, inspection data sheets, and still photographs and videos will be reviewed by the CM. All reports will be evaluated for internal consistency, accuracy, and completeness. The daily reports will be summarized into brief monthly acceptance reports. The reports will indicate that work has been completed and approved according to the specified design. These reports will be included in the project files and be available to the regulatory agencies, if requested.

## 6.5 Final Construction Report

At the completion of the construction activities, a Final Construction Report will be prepared by the CM and sent to EPA. This report will include the following:

- Narrative containing project description; identification of project design team, CQA personnel, and Contractor; and description of field inspection operations, unusual conditions, and final quantities

- Overview of project, including a general summary of the project and citations to final design documents, work duration, primary construction activities, and summary of work completed and methods, by area.

- Deviations from design and material specifications with justifying documentation

- Listing of quantities and types of materials removed off-site, and a listing of the ultimate destination(s) of those materials.
- Figure showing the remedial action that was implemented at the site, clarifying any changes that occurred during construction. This figure would include the depth of excavations in all areas and ditches.
- Presentation of the analytical results of all sampling and analyses performed (including a map showing the locations of confirmatory samples).
- A good faith estimate of total costs or statement of actual costs for implementation of the remedial action, including oversight costs.
- Summary and listing of change orders that were approved during construction. For example, the report should identify items such as changes in rock size for backfill of the ditches; changes in the areas remediated; or changes in import materials.
- Summary and dates of pre-final and final inspections, with references to inspection reports.
- Relevant documentation generated during the remedial action should be provided in appendixes (for example, daily/weekly/monthly reports, inspection data sheets, photographs, videos, test results and locations, acceptance reports, manifests, invoices, plan sheets, conformational sampling results, survey data, QA review reports/chains-of-custody)

During construction, the CM will be responsible for all CQA documents and organization of the documents for easy access. Furthermore, the CM will be responsible for incorporating any revisions to the CQA Plan and distributing revised copies to the Contractor and all other relevant parties.

## 6.6 Record Drawings

The Contractor is responsible for submitting complete and accurate Record Drawing information to document the completed construction work. The Contractor will provide Record Drawings to the remedial action oversight engineer for review and approval. While the Contractor is ultimately responsible for provide complete Record Drawing information, the drawings will include the following information:

- Plan drawings documenting the limits and depths of excavation, including control points defining the limits of excavation cells, and coordinates of confirmation samples.
- Plan drawings documenting finished grades of all grading and backfill areas, including ditch slopes
- Plan drawings documenting the location and elevations for all new or modified culverts, trench drains, catch basins, monitor well monuments, well vaults, permanent fences, and any other structures or site features modified during construction.
- Plan drawings documenting utility locations, and any utility modifications installed during construction

- Plan drawings showing survey data documenting limits of pavement reconstruction and patch/repair locations
- Plan drawings showing the limits of low-permeability asphalt overlay, and survey data documenting the finish grade of the overlay
- Detail drawings showing typical ditch backfill and erosion protection material installation
- Detail drawings showing pavement overlay construction including transitions at concrete slabs, building foundations, building entrances and other modifications required to complete the overlay

After the Engineer's review and approval, the drawings will be stamped by a professional engineer to certify that remedial action construction was completed in accordance with the design drawings and specifications.

## ATTACHMENT 1

# Field Inspection Data Sheets

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## *Taylor Lumber and Treating Superfund Site Remedial Action*



PROJECT NO. ______________________

# *DAILY INSPECTION DIARY*

(1) **DAY:** ________ **DATE:** ________ **WORK PERIOD:** ________ a.m p.m. **TO** ____________ a.m. p.m. **REPORT NO.** ________

**WEATHER:** ______________ **TEMP. MAX** _____ **°F: MIN** _____ **°F: PRECIPITATION:** ______________

(2) **NUMBER AND CLASS OF PERSONNEL EMPLOYED:**

(3)

| MAJOR EQUIPMENT ON PROJECT AND AMOUNT OF USE | | | |
|---|---|---|---|
| **No.** | **Description** | **Size/Capacity** | **Hrs. Oper.** |
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(4) **WORK ACCOMPLISHED TODAY:**

(5) ______________________ SIGNATURE/TITLE ________ DATE

*Taylor Lumber and Treating Superfund Site Remedial Action*

# *DAILY INSPECTOR'S REPORT*

DATE: ______________________

SCHEDULE: ______________________ PROJECT NO: ______________________

LINE: ______________________

INSP: ______________________

| Items of Work Completed | Location | Amount | Remarks |
|---|---|---|---|
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**Remarks:**

______________________ SIGNATURE/TITLE

______________________ DATE

*Taylor Lumber and Treating Superfund Site Remedial Action*

# *DEFECTIVE/REJECTED WORK NOTIFICATION*

TO CONTRACTOR: ______________________ NOTIFICATION NO: ______________

PROJECT: Taylor Lumber and Treating Superfund Site PROJECT NO: ______________

OWNER: ______________________ TIME: ______________ AM/PM

ENGINEER: ______________________ OBSERVER: ______________

Pursuant to the GENERAL CONDITIONS of the Contract, you are hereby notified of the following noncompliance violation:

Specification Section: ______________ Paragraph: ______________

**Violation:**

**Contract Requirement:**

Violation Detected by: ☐ Test ☐ Inspection ☐ Observation

Noncompliance Work is: ☐ Defective ☐ Rejected

Estimated Value of Noncomplying Work: $ ______________

Defective work shall be corrected. Rejected work shall be removed and replaced. All costs shall be borne by the Subcontractor. Payment will not be made for defective or rejected work. Subcontractor shall notify Engineer when defective or rejected work is corrected.

Received by:

Engineer: ______________________ ______________________

Authorized Representative Subcontractor

Date: ______________________ ______________________

Title

______________________

Date

**Distribution:**
1. Engineer
2. Owner
3. Field File

CVO/063350020

CH2MHILL

## *Taylor Lumber and Treating Superfund Site Remedial Action*



# *DEFECTIVE/REJECTED WORK NOTIFICATION LOG*

PROJECT: Taylor Lumber and Treating Superfund Site Remedial Action

PROJECT NO:

CONTRACTOR:

| Notification Number | Date | Spec Section | Defective/Rejected Work | Accepted | |
|---|---|---|---|---|---|
| | | | | By | Date |
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SIGNATURE/TITLE

DATE

*Taylor Lumber and Treating Superfund Site Remedial Action*

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# *PHOTO RECORD FILE INDEX*

ROLL/FILE NO: ______________________

PERIOD FROM: ____________ TO ______ 20 ___

PROJECT: Taylor Lumber and Treating Superfund Site Remedial Action

PROJECT NO: ______________________

PREPARED BY: ______________________

| **Picture Number** | **Photo Description/Location** | **Date** | **Daily Log Number** |
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______________________ SIGNATURE/TITLE

______________ DATE

**TAYLOR LUMBER AND TREATING SUPERFUND SITE REMEDIAL ACTION**
**MATCON™ INSTALLER'S CERTIFICATION**
**OF**
**SUBSURFACE ACCEPTABILITY**

MatCon™ installer, ________________________________________
for Project: Taylor Lumber and Treating Superfund Site Remedial Action

hereby certify that supporting surfaces are acceptable for installation of MatCon™, undersigned having personally inspected condition of existing and constructed surfaces. This certification is for areas shown on Attachment or defined as follows:

________________________________________

________________________________________

________________________________________

________________________________________

Condition of supporting surfaces in defined area meets or exceeds minimum requirements for installation of MatCon™.

Signed: ________________________________________
(Representative of MatCon™)

________________________________________
(Position)

Date: ________________________________________

Witness: ________________________________________